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SUMMARY OF RECENT ABSTRACTS*

III. MALARIA

[*Continued from* p. 228]

Treatment

A publication on the anti-malarial drugs has been issued by the Ross Institute (p. 201), in which the most valuable and well known of the modern drugs are briefly described. This is a useful pamphlet. STAUB (p. 10) has summarized in German the recent work on the chemotherapy of malaria.

The treatment of *P. falciparum* malaria is summarized by COVELL (p. 11). He discusses the actions and side-effects of quinine, mepacrine, proguanil, chloroquine and other drugs, and makes the point that different strains of *P. falciparum* from different parts of the world vary widely in their response to treatment with the same antimalarial drug. He gives details of a useful schedule of mepacrine and proguanil, and mentions the use of intravenous quinine in pernicious cases. Good results in such cases have been achieved with intramuscular injections of mepacrine, chloroquine or camoquin.

In an enquiry made in Nigeria, BRUCE-CHWATT and BRUCE-CHWATT (p. 956) found that although proguanil is generally preferred to other drugs as a suppressive, it is not favoured as the sole drug for treatment of attacks of *P. falciparum* malaria. They remark that quinine is still the most used drug for emergency treatment of grave infections, and they give a list of the answers supplied by medical men to the question which drug is favoured for treatment in general. There is no unanimity of opinion. In a small epidemic of *P. falciparum* malaria in Kenya, HANDFIELD-JONES (p. 955) treated soldiers with chloroquine, proguanil, mepacrine or quinine, and notes that the first was the most effective in bringing down the temperature.

COATNEY *et al.* (p. 318) carried out experiments with the Chesson (New Guinea) strain of *P. vivax* and the use of mepacrine, colchicine and quinine in prophylaxis and treatment. Attacks after cessation of short courses of prophylactic treatment, during the course of which infection was induced by bite, tended to occur earlier than with the St. Elizabeth strain. Experiments on volunteers by YOUNT and COGGESHALL (p. 435) in which the Chesson strain of *P. vivax* was used, show that after eradication of acute or chronic infection by

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

chemotherapy there is a temporary immunity to reinfection by the homologous organism, which bears a positive relation to the number of relapses, but not to the duration of infection before cure. Resistance was greater to sporozoite than to trophozoite reinfection, probably owing to the greater number of parasites inoculated as trophozoites. Lasting resistance to infection depends upon existing infection, either active or subclinical.

In investigations on the action of two drugs given simultaneously to chicks infected with *P. lophurae*, REILLY *et al.* (p. 717) found that the actions of quinine with plasmoquine, and of quinine with pentaquine, were synergic, whereas the actions of quinine with atebrin, and of atebrin with plasmoquine, were additive.

TOURENC (p. 521) discusses the indications for splenectomy of malarial spleens, on the basis of 15 cases. The abstract should be consulted for details.

Quinine.—The use of quinine in acute forms of malaria is discussed by WINCKEL (p. 317) and by RANSOME (p. 317) ; the latter gives details of the use of blood or plasma transfusion in these cases. Large doses of quinine produce effects demonstrable in monkeys by electrocardiography, especially in malarious monkeys, and RIGDON and RUSKIN (p. 14) think that these effects are related to the degree of anaemia. VANBREUSEGHEM (p. 201) reports a girl strongly sensitive to quinine.

FLOCH (p. 713) reports 4 cases of tetanus after injection of quinine ; he discusses compulsory inoculation of tetanus toxoid for people living in the tropics. DELBET, discussing this paper, makes the point that the injected quinine may be sterile, but that it reduces the activity of leucocytes and allows tetanus bacilli, which enter through abrasions, to multiply.

DÄHNE (p. 202) shows that administration of quinine or atebrin to normal or malarious persons results in reticulocytosis in 3–8 days, which indicates action on the bone marrow. The development of reticulocytosis after specific treatment is therefore probably not a sign of latent malaria.

Quinine carbonate is poorly absorbed in comparison with the sulphate or ethylcarbonate (WINCKEL *et al.*, p. 712). QUIROGA (p. 112) has used quinine-resorcin in *P. vivax* malaria.

Neochin, a product of cinchonine, is not a satisfactory preparation for malaria (JASWANT SINGH ; CHAUDHURI and RAI CHAUDHURI, p. 1176). Febrifugine, from *Dichroa febrifuga*, has some antimalarial properties, but its emetic effect precludes its use (COATNEY *et al.*, p. 1177).

Mepacrine.—Work recorded by KENNY (p. 592) indicates that the development of gametocytes tends to be much greater in patients with *P. falciparum* infections treated with a total of 1·5 gm. mepacrine than in those treated with a total of 2·4 gm.

Unpleasant side effects of mepacrine are described by SMITH *et al.* (p. 1173) in the Philippines, where they were few and not serious, but FEDER (p. 435) reports atypical lichen planus, eczematoid dermatitis and exfoliative dermatitis in American troops in the Far East after suppressive mepacrine. FISHMAN and KINSMAN (p. 203) record 7 cases of hypoplastic anaemia after suppressive mepacrine ; in most it was first noted 1–3 months after the drug had been discontinued. Three patients died. Two cases of psychosis in patients who had taken mepacrine for giardiasis are recorded by KAPUR and DAS GUPTA (p. 592).

The metabolism of some 9-aminoacridine derivatives is described by MCCHESNEY and MCAULIFF (p. 437).

Paludrine.—Good results with paludrine (proguanil) are reported by SZYMONSKI (p. 113) for *P. vivax* infections, PEETERS (p. 204) who has used the lactate by intramuscular injection, and REY and DE ZULUETA (p. 714) who gave 300 mgm. in a single dose in rural areas of Columbia.

CIUCA *et al.* (p. 593) finds that daily doses of 100–300 mgm. for 5–10 days are effective for experimental *P. vivax* or *P. falciparum* infections (induced by blood injection or sporozoites). BLANC (p. 113) and SCHNEIDER and MÉCHALI (p. 204) find it satisfactory against *P. falciparum* but less so against *P. vivax*, which shows a strong tendency to relapse. It acts more slowly than some drugs on *P. malariae*. THIODET and FABREGOULE (p. 204) quote a case in which it apparently produced haematuria. Other unpleasant side effects are reported by BILLINGTON (p. 521).

Resistance to proguanil has been produced by COOPER *et al.* (p. 1057) even in the normally sensitive Chesson strain of *P. vivax*, which they developed to resist 1,000 times the usual controlling dose ; a similar technique did not produce resistance to chloroquine. SMITH *et al.* (p. 1174) mention resistant strains of *P. vivax* in the Philippines, where more relapses follow treatment with proguanil than with chloroquine. BINCER (p. 593) in Danzig now uses proguanil followed by aralen (chloroquine) to avoid relapses in *P. vivax* malaria. A strongly resistant strain of *P. falciparum* is reported by CHAUDHURI and RAI CHAUDHURI (p. 1175).

By experiments on administration of antimalarial drugs to *Aëdes aegypti* infected with *P. gallinaceum*, GEIGY and RAHM (p. 15) have shown that proguanil affects not only the gametes and oökinetes in the lumen of the gut, but also inhibits the development of sporozoites in the oöcysts, which are ultimately killed. Proguanil (and also mepacrine) inhibits the development of parasites into oöcysts.

Chloroquine.—Chloroquine can be given by intramuscular injection, and is effective by that route, but as it is quickly absorbed from the alimentary tract SPICKNALL *et al.* (p. 318) do not recommend injection in patients who can take it by mouth. Good results with chloroquine are reported by DURAND *et al.* (p. 957) in Tunisia, in courses lasting one day ; by ROBIN and ISSA (p. 205) in Dakar ; by ASTRABADI (p. 957) in Baghdad ; by CANET (p. 205) in Indo-China [he used nivaquine, presumably nivaquine B] ; and by BRITO and COTRIM (p. 1174) in Brazil.

In immune adults in Central America BUTTS (p. 1057) has found that 1·2 gm. of chloroquine, divided into two doses at an interval of 8 hours, was effective in treatment. For suppression 0·25 gm. once a week was successful.

Nivaquine ; Camoquin.—In patients from Indonesia with *P. vivax* malaria treated in Rotterdam HULSHOFF (p. 806) found that the relapse rate was smaller after treatment with nivaquine C followed by pamaquin, or proguanil followed by pamaquin, than with nivaquine C alone.

COATNEY *et al.* (p. 1060) carried out a test of camoquin in malaria due to the Chesson strain of *P. vivax*. Its effect is comparable with that of chloroquine, though slightly slower in treatment of attacks. Camoquin acts only on the erythrocytic stages of the parasite. Favourable reports on camoquin are contributed by HOEKENGA (p. 592) ; by CHAUDHURI and CHAKRAVARTY (p. 958) (who used a single-dose régime) ; and by DEANE and SUTTER (p. 1058) in Brazil. Its toxicity is low.

Other drugs.—HUGHES and SCHMIDT (p. 965) discuss the metabolism of some 8-aminoquinolines in the rhesus monkey.

In Holland, BYLMER (p. 202) showed that treatment of *P. vivax* malaria with quinoplasmine was much more effective in preventing relapses than treatment with quinine alone. MENK and MOHR (p. 112) tried the 5-day mepacrine-pamaquin treatment of Hauer in *P. vivax* malaria, but conclude that it has no advantage over earlier methods. They give details of dosage. KOENIG (p. 713) thinks that plasmoquine acts on the tissue forms of *P. vivax* more effectively in the presence than in the absence of a schizonticidal drug. FISCHER (p. 319) discusses the optimum dose of plasmoquine with which to

treat *P. falciparum* malaria with the object of eliminating gametocytes from the blood.

GREENBERG (p. 214) shows that there is synergism between the actions of chlorguanide [paludrine] and those of sulphonamides which are antagonized by *p*-aminobenzoic acid, in relation to *P. gallinaceum*. He (p. 443) has investigated the antimalarial activity of 2,4-diamino-6,7-diphenyl pterin, its potentiation by sulphadiazine and its inhibition by pteroylglutamic acid. GREENBERG and RICHESON (p. 1186) have found two preparations which potentiate the antimalarial activity of sulphadiazine.

ARDIAS (p. 319) has used a sulphone with some success in malaria.

COATNEY *et al.* (p. 444) show that aureomycin in high doses has some activity against *P. gallinaceum*, and (p. 438) against *P. vivax*. The results do not indicate that it is a really useful antimalarial drug.

Suppressive treatment

During the war, troops in Brazil were successfully protected by administration of mepacrine (CODA, p. 207).

Proguanil in a dose of 100 mgm. twice each week has been used for suppression of malaria by DIXON (p. 807) in Kenya, who gave it to labourers and observed a 90 per cent. reduction in malaria, a result which was not improved when DDT was used in addition. A similar result was achieved by BANERJEA (p. 1178), but the cost was too high for general use, and by BLANC (p. 113) in troops in Indo-China. In Java, VAN GOOR and LODENS (p. 807) think that this dosage is ideal in a community in a highly endemic area in which there is some degree of immunity. Death rates fell, birth rates rose and physical efficiency increased, but the appearance of resistant forms of *P. malariae* and *P. falciparum* was observed. The same dosage was successful in a prison in New Guinea (I E ROOK, p. 206).

WATSON *et al.* (p. 806) found that a weekly dose of 100 mgm. proguanil was not enough to suppress malaria in Formosa, and they doubt whether suppression should be attempted there. Proguanil, however, is regarded as the drug of choice for treatment of an attack. Strains of *P. falciparum* resistant to proguanil have been observed in Malaya by FIELD and EDESON (pp. 12, 437) in places where proguanil has been used as a suppressant, and by SEATON and ADAMS (p. 12) who think, however, that the occurrence of such strains in nature is not very probable as a result of the use of subcurative doses, because proguanil possesses a highly sterilizing action on gametocytes.

In volunteers infected with the Chesson strain of *P. vivax* by mosquito bite, LINTS *et al.* (p. 1059) found that a weekly dose of chloroquine or proguanil (0·3 gm. base in each case) successfully suppressed symptoms for many months, but that when the drug was discontinued, attacks occurred in every case. The same dose of chloroquine was found effective in Lebanon by BERBERIAN and DENNIS (p. 114), who note that it can be safely taken for 7 months, and suggest that malaria may be eradicated if this is continued and if DDT is used, and also by BOLDT and GOODWINE (p. 320) in Panama. CANET (p. 206) in Indo-China prefers chloroquine to proguanil, and states that there were no symptoms of intolerance in his series.

In Morocco suppressive treatment by nivaquine [presumably C] and proguanil, each with rhodopraequine, was undertaken by GAUD *et al.* (p. 1176). Results were good, but there was some evidence of developing resistance to proguanil. ROBIN and SERRE (p. 1058) have used proguanil, chloroquine and premaline N for suppression in children in Dakar, with equal success.

Neo-premaline, chloroquine and pentaquine, or the last two together, were used with success by WALLACE (p. 1059) to suppress malaria on a rubber estate in Malaya.

FINDLAY (p. 13) shows that as a suppressive of *P. falciparum* sulphapyrazine gave better results than mepacrine in European troops in West Africa during the war, but it was relatively ineffective in treatment of acute attacks.

Control : General

A small book, by an anonymous author (p. 101) has been published to provide a manual of instruction for Africans being trained in the prevention of malaria. It should prove excellent for that purpose.

The malaria control activities of W.H.O. form the subject of a communication by RUSSELL (p. 809).

COLLARI (p. 594) has written a short history of the Agro Pontino in relation to malaria, from the earliest known times to the present, when bonification has apparently solved the problem.

The suggestions made by Andrews and Hall for malaria control in Iran are recorded by ZIONY (p. 813), who shows that more than one-quarter of the people live in malarious areas.

In an important paper WALTON (p. 208) describes the measures taken during the war to reduce the incidence of malaria in Freetown, Sierra Leone, by the use of larvicides and pyrethrum insecticide, and the administration of mepacrine. These brought down the risk of infection of Europeans (including the troops) in 1945 to only 4 per cent. of the 1941 proportion, and greatly reduced the infection rate in Africans, and the numbers and infection rates of *Anopheles gambiae.*

The antimalarial measures taken in Old Goa are described by CAMBOURNAC (p. 1180).

The eradication of malaria from the United States is now reaching its final stages, and ANDREWS and GILBERTSON (p. 815) show that it is now advisable, for economy, to concentrate future work in the neighbourhood of reported cases, and that diagnosis should therefore be accurate.

Residual Insecticides

The use of DDT as a residual spray for the control of adult anophelines is now widespread, and many papers on it have been published in the period under review. BHC is also widely used in the same way.

The following work has been summarized :—

Name : Country	*Results*
CLAVERO *et al.* (p. 812), Spain ...	For control of *A. m. labranchiae* in rice-fields.
REY VILA (p. 958), Spain ...	Reduction of malaria to one-tenth in rice-growing area with BHC residual spray against *A. m. atroparvus.*
BUONOMINI and MACCARRONE (p. 439), Elba	Complete eradication of *A. m. labranchiae* probable.
CAVAILLON *et al.* (p. 1179), Corsica	Good prospects for elimination of malaria.
LOGAN (p. 810), Sardinia ...	No cases of primary malaria found in 1949 ; *A. m. labranchiae* very greatly reduced.
PATRISSI (p. 115), Italy ...	Very successful though certain vectors are not eliminated.
JERACE (p. 320), Italy, Agro Romano	DDT used since 1947, incidence of malaria 1948–49 lower than ever before.
SEPULCRI (p. 320), Italy ...	Great reductions in primary attacks and relapses, and in spleen and parasite rates.
MOSNA and ALESSANDRINI (p. 1180), Italy	DDT residual spray alone is able to suppress transmission.

Name : Country	*Results*
MANISCALCO (p. 714), Sicily ...	DDT residual spray, and Paris green, were used. A remarkable fall in malaria resulted, but eradication may not be possible.
AZIZ (p. 207), Cyprus	Great success, but in addition to DDT residual spray the main effort is against breeding places.
LIVADAS *et al.* (p. 594). LIVADAS (p. 812), Greece	Great reduction in parasite rates, incidence of malaria and consumption of quinine. Great reduction in *A. sacharovi*, *A. maculipennis* and (smaller) *A. superpictus*.
OKAN (p. 595), Turkey	DDT residual spray and administration of mepacrine gave great reduction in incidence and in general death rate, and increase in birth rate.
GAUD *et al.* (p. 595), Morocco ...	DDT and BHC disappointing, action is short-lived probably because they are quickly absorbed in wall material.
LE GOUAS (p. 1061), Dakar ...	Residual spray and antilarval methods have reduced malaria considerably.
DOWLING (p. 321), Mauritius ...	DDT and BHC. Reductions in spleen and parasite rates, but there may have been seasonal influences.
Malaria Institute of India (p. 814), India	DDT and BHC successful particularly against *A. fluviatilis*.
JASWANT SINGH and KARIAPA (p. 963), India (Coorg)	Most satisfactory in a gradually declining population. Spleen rates now reduced to one-fifth, general health greatly improved.
JASWANT SINGH and DALIP SINGH (p. 963), India (159 villages)	No infected infants found in sprayed villages ; elsewhere malaria was endemic.
VISWANATHAN and RAMACHANDRA RAO (p. 1062), India (Dharwar and Khanapur districts)	*A fluviatilis* and *A. culicifacies* very greatly reduced.
VISWANATHAN (p. 1062) ; VISWANATHAN *et al.* (p. 1063), India	Effect on general death rate not marked, but is definite on birth rate, morbidity and death rate from malaria. They have also used BHC.
RAMAKRISHNAN *et al.* (p. 441), India (Madras)...	Considerable reduction of malaria and *A. fluviatilis*.
ADHIKARI and GANGULI (p. 1181), India (Bengal-Nagpur railway)	Good results ; proguanil also administered.
HAJRA (p. 441), India (Orissa) ...	Encouraging results against *A. annularis* (and also *C. fatigans*).
WHARTON and REID (p. 321), Malaya	DDT and BHC both effective against *A. maculatus*.
SWELLENGREBEL and LODENS (p. 211), Java	Effective against *A. aconitus* ; no evidence of important repellent effect.
STAGE and PRATT (p. 1066), Porto Rico	Gives the best control of anophelines.
POOL (p. 115), Venezuela ...	Incidence of malaria in an oil company reduced from 331 to 43 per 1,000. *A. darlingi* well controlled. Classical methods should not be abandoned.

Name : Country	*Results*
DE BUSTAMANTE *et al.* (p. 815), Brazil	Good results.
PINOTTI (pp. 116, 1064), Brazil...	DDT spray widely used.
DEANE *et al.* (p. 1065), Brazil (Amazon)	Great reduction in malaria.
Department of Malaria (p. 964), Peru	Remarkable reduction in malaria.
ALVARADO *et al.* (p. 716), Argentina	Great reduction in the number of people needing treatment for malaria.

In the report on the malaria eradication scheme for Cyprus for 1948 AZIZ (p. 207) shows that great progress was made ; the number of breeding places fell from 0·33 per cent. of waters examined in January, to 0·0003 per cent. in November. The numbers of cases of malaria reported (though it is not a notifiable disease) had fallen from 7,686 in 1944 to 406 in 1948. He gives details of staff and expenditure.

DEONIER *et al.* (p. 443) compare the effects of DDT and other insecticides on various mosquitoes.

In a field study carried out in a plantation in the Belgian Congo, DAVIDSON (p. 597) found that of the three anophelines *A. moucheti*, *A. gambiae* and *A. paludis*, the first was by far the most common. *A. moucheti* breeds in the shade of grasses at the edges of rivers, and most of the females feed in the evening or at night, and after feeding they rest in houses at least until the following morning. Sporozoites were found in 0·38 per cent. of *A. moucheti*, and 3·8 per cent. of *A. gambiae*. As a result of a careful experiment on the use of BHC in a number of these villages, the same author (p. 959) concludes that it retains its toxicity for *A. moucheti* for 3 months, when applied to the walls of houses. It seems probable that in the treated villages many of the mosquitoes were not living long enough to transmit malaria, and there are indications that the general age of the mosquito population is being reduced. After one year, during which several applications of BHC were made, there was little change in the parasite rates in children, but the parasite counts were rather lower. It is, perhaps, too soon to expect better results, which elsewhere have only appeared two years after first application.

Muirhead THOMSON (p. 439) has continued his work on the effect of residual insecticide sprays on *A. gambiae*, and has obtained in East Africa results similar to those he found in West Africa. With the preparations of DDT and BHC used, the vehicle being water only, he found that with DDT few of the *A. gambiae* which entered huts were killed, whereas with BHC the majority were killed, and the lethal effect persisted up to 13 weeks.

In French West Africa control of malaria is attempted in large centres and other important communities. BERNET (p. 596) discusses the organization set up in 1948 to effect this. He points out that there seem to be two varieties of *A. gambiae*, one of which leaves buildings soon after feeding. It is unlikely that DDT residual spray will be as useful as in some other countries. The control of breeding places remains important.

SUNDARARAMAN and PEFFLY (p. 323) show that suspensions of DDT are more satisfactory than solutions for application to typical walls of houses in India.

BERTRAM (p. 814) quotes experiments carried out in Assam which suggest that *A. minimus* reacts to DDT in the same way as *A. gambiae* in Africa, and that BHC is a better preparation to use.

As *A. punctulatus* tends to attack man in the open air, SWELLENGREBEL and STACK (p. 211) think that DDT sprayed in houses is not likely to be effective against them. A similar remark is made by BUXTON in a comment on a paper by STAGE and PRATT (p. 1066) which relates to *A. albimanus*.

PENIDO *et al.* (p. 600) have found that indoor spraying with DDT in part of Brazil where houses are scattered is not enough to reduce larvae of *A. darlingi* found in the neighbourhood. Treatment of water at intervals of 30 days with DDT emulsion at 5 parts per million is satisfactory.

The use of DDT in kerosene as a barrier spray in Malaya, where *A. letifer* is the chief vector, is reported by NAIR (p. 1064). A belt of ground (with its vegetation) 20 yards wide was sprayed around groups of houses, and the effect of this was to prevent the entry of anophelines for periods up to 12 days.

Control of Larvae

DARROW (p. 323) made a study of larvae of *A. quadrimaculatus* placed in an experimental pool in the Tennessee valley, the level of which was then changed. Observations were made on survival of larvae left stranded. The use of synthetic plant hormones for the control of plants in reservoirs in the Tennessee Valley is discussed by HALL and HESS (p. 1061).

BUSVINE (p. 599) shows that the presence of a thin film of "Malariol" on water exerts a slight repellent effect on female *A. vagus* so that fewer eggs are laid on such water than on water without the oil.

NEWBOLD and GILLETTE (p. 809) have devised self-clearing sea heads for culverts draining to the sea in Trinidad, where *A. aquasalis* is the vector.

DY *et al.* (p. 1178) have used the Smith automatic siphon in the Philippines, and describe its construction.

A study of the effect of DDT on anopheline larvae, pupae and adults is reported by JOHNSTON (p. 210).

MATHIS and QUARTERMAN (p. 442) prepared solutions of DDT and BHC from which emulsions are made which have considerable residual larvicidal effect in ponds. SMITH and DY (p. 211) describe the use of sawdust saturated with DDT in oil, for the control of streams in which *A. minimus flavirostris* breeds. REID *et al.* (p. 714) show that DDT and BHC, used in oil as larvicides, have little residual action after a few days in Malaya, but the effect of these insecticides in Malariol can, for a short time and at much lower cost, equal the effect of much larger amounts of Malariol alone.

Experiments on the treatment of germinated rice seed with DDT, for control of mosquitoes in rice fields, are reported by SPERBECK (p. 715) from America. GEIB (p. 715) also discusses the use of DDT in rice fields in America.

HESS (p. 715) describes investigations on optimum size of droplets for aerosols containing DDT and discharged from aircraft. JONES (p. 322) has used DDT as a spray from aircraft in Burma; the difficulty of penetration of thick vegetation remains. Favourable results were obtained by DEONIER *et al.* (p. 13) from DDT spray (both fine and coarse) from aircraft in the control of *A. quadrimaculatus*.

FERREIRA and RACHOU (p. 212) review the possible methods of dealing with anophelines of the sub-genus *Kerteszia*. RACHOU *et al.* (p. 600) have used a helicopter for the control of *Kerteszia*, which breed in bromeliads, from which they have sprayed aqueous suspensions of DDT wettable powder. Some reduction was effected, probably owing to the action on adults rather than on larvae. In further work, RACHOU and FERREIRA (p. 815) have used "thermo-fogs" of DDT or BHC with some success in experiments on the control of breeding of anophelines of the sub-genus *Kerteszia*. HILL (p. 964) sums up the achievements in control of mosquitoes in the Caribbean area by means of DDT. He notes that the copper sulphate treatment of bromeliads in Trinidad has almost eliminated malaria from a large area, and the bromeliads, in which *A. bellator* breeds, have not reappeared.

Malaria of monkeys, birds, etc.

Monkeys.—RODHAIN (p. 601) has succeeded in transmitting *P. vivax* to one chimpanzee by injection of defibrinated infected human blood, but not by injection of sporozoites or the bite of infected mosquitoes. The results suggest that the pre-erythrocytic forms are completely obliterated but that the erythrocytic forms manage to persist for a short time, and also that *P. vivax* and *P. schwetzi*, though morphologically identical, are biologically distinct.

TALIAFERRO and TALIAFERRO (p. 601) have studied the progress of asexual reproduction of *P. knowlesi* in rhesus monkeys, in relation to the number of merozoites, the length of the cycle, the degree of parasitaemia, and the effect of immunity. Details of this work cannot be reproduced here but may be found in the original abstract.

RIGDON and BRESLIN (p. 602) have investigated the effect of administration of human blood in monkeys infected with *P. knowlesi* ; this led to marked decrease in parasitaemia, and death was delayed.

OVERMAN *et al.* (p. 116) write of the effect of lipo-adrenal extract on ionic balance in fatal *P. knowlesi* malaria of monkeys.

In *P. knowlesi* infection of monkeys proguanil, mepacrine, chloroquine and camoquin are satisfactory, but camoquin seems to be the best (SINGH *et al.*, p. 1181).

Birds.—REICHENOW (p. 116) discusses the development of certain malaria parasites in birds ; and CORRADETTI (p. 117) discusses pathology and immunity. OGAKI (p. 16) writes of the bird malaria parasites found by him in Malaya, and MICKS (p. 117) of the parasites of sparrows in the United States.

BELTRÁN and VILLASANA (p. 443) show that infection of chicks was possible with plasma from infected birds, which had been doubly centrifuged, although no red cells could be found, but not with plasma which had been passed through a Seitz EK filter.

CURD *et al.* (p. 1185) have prepared a derivative of proguanil which is highly active in bird malaria and has a marked action on exo-erythrocytic forms.

LEWERT (p. 817) succeeded in growing tissues from the pia mater and the myocardium of chicks infected with *P. gallinaceum*, and in these tissue cultures the exoerythrocytic forms were maintained for 105 and 34 days respectively. These forms, when injected again into chicks, do not readily produce erythrocytic forms, but produce infection with the exoerythrocytic forms. The author (p. 818) comments on this separation of the two cycles, and on the high production of gametocytes which takes place from the exoerythrocytic forms. DUBIN *et al.* (p. 327) have succeeded, apparently for the first time, in inducing the development *in vitro* of sporozoites of *P. gallinaceum* into cryptozoites. This was effected in tissue culture of spleen of chick embryos, and the development took place in macrophages.

VEROLINI (p. 326) has studied the endohistiocytic cycle of *P. gallinaceum* in splenectomized fowls.

The relative susceptibilities of various mosquitoes to *P. gallinaceum* are discussed by CANTRELL and JORDAN (p. 118).

RAGAB (p. 213), in a thesis, discusses studies on the relationship between some mosquitoes and *Plasmodium gallinaceum*. The original abstract should be consulted for details.

TALIAFERRO and TALIAFERRO (p. 1184) have studied the initial inspection and homologous superinfection of *P. gallinaceum* and *P. lophurae*. For details the original should be consulted.

DÍAZ MELCHOR and APARICIO GARRIDO (p. 717) describe the preparation, from blood infected with *P. gallinaceum*, of an antigen for a complement fixation reaction.

The effect of X-rays on chicks infected with *P. gallinaceum* or *P. lophurae* was shown by BENNISON and COATNEY (p. 524) to increase their susceptibility to the infection.

BISHOP and BIRKETT (p. 524) discuss prolonged treatment of chickens infected with *P. gallinaceum*, and the effect of such treatment on birds inoculated with blood either from donors which showed exoerythrocytic forms, or from those which did not. Details should be sought in the original.

BISHOP and MCCONNACHIE (p. 525) show that a strain of *P. gallinaceum* resistant to paludrine fully retained that resistance for 54 weeks, involving a large number of intravenous passages at intervals of 2–3 days, though no paludrine was given to the birds. The same authors developed resistance to sulphadiazine in a strain of *P. gallinaceum* and found that some cross resistance to other substances developed at the same time. This does not necessarily mean that the drugs all have the same mode of action.

GOODWIN (p. 324) has studied the action of various antimalarial drugs on *P. gallinaceum* in chicks and *P. berghei* in mice. There are differences, which may reflect differences in the reactions of the hosts or of the parasites to the same drug.

GREENBERG *et al.* (p. 603) have examined the action of antimalarial drugs on infections in chickens with small numbers of sporozoites of *P. gallinaceum*.

MOULDER (p. 118) shows that treatment of the host with quinine inhibits pyruvate oxidation by *P. gallinaceum*.

DESCHIENS and PICK (p. 16) show that administration of para-aminosalicylic acid to adult fowls prevents the normal development of full parasitaemia with *P. gallinaceum*. This drug is an antagonist of pantothenic acid, without which the parasite does not thrive.

JASWANT SINGH *et al.* (p. 1186) report on the antimalarial activity of some biguanide derivatives against *P. gallinaceum*.

BECKER *ei al.* (p. 325) observed a lesion of the eyelids of chickens with *P. lophurae* infection, which had received a certain diet. It seems probable that there was an acute dietary deficiency as a result of competition of the host and parasite for either biotin or pantothenate or both ; but other factors are also probably involved.

MCGHEE (p. 14) has studied the course of infection with *P. lophurae* in chick embryos, and also (p. 1184) infection by *P. lophurae* of erythrocytes of various animals introduced into the circulation of chick embryos.

In experiments on ducks BECKER *et al.* (p. 603) show that, if blood transfusion is performed at the height of parasitaemia with *P. lophurae*, the degree of parasitaemia is maintained at a high level, and life is prolonged. It seems that the reticuloendothelial system is unable to destroy the parasites if there are enough erythrocytes for them to live in, and that immunity does not reside in the erythrocytes themselves, since transfused cells from immune birds are as susceptible to invasion as those from birds not immunized. TRAGER and MCGHEE (p. 816) have found that serum of uninfected adult fowls or ducks, when injected into chicks or ducklings immediately after blood infection with *P. lophurae*, reduces parasitaemia in comparison with controls. The substance responsible for this effect may be the factor which renders adult birds resistant to the infection ; it is different from the specific antibody formed as a result of infection. *In vitro*, however, the addition of plasma from adult fowls had no inhibitory effect on cultures of *P. lophurae* in chicken erythrocytes. MCGHEE and TRAGER (p. 1067) describe the media used.

REILLY *et al.* (p. 326) state that in chickens infected with *P. lophurae* acquired immunity is manifested on the fifth day of infection. They therefore test antimalarial drugs on the fourth day. The quinine equivalents of quinacrine, pamaquin and pentaquine, according to this test, are given.

TORREY and KAHN (p. 15) have developed an antigen from the blood of ducks infected with *P. lophurae*, which can be used in a precipitation test and gives positive results with sera from infected birds but not with normal sera. Precipitins are found for only a short time after recovery from the infection.

BECKMAN (p. 327) failed to secure survival of sporozoites of *P. cathemerium* in plasma of either canary or hen, unless canary cells were present. In comment, Garnham quotes his own work in which sporozoites of *P. gallinaceum* were kept alive for 72 hours in hen plasma.

SERGENT (p. 303) discusses the exo-erythrocytic cycle of *P. relictum*, but for details the original should be consulted.

MICKS (p. 328) shows that incomplete development of *P. elongatum* took place in certain mosquitoes, and complete development in *Culex pipiens*. By breeding from susceptible individuals a strain of *C. pipiens* was obtained which was very much more susceptible than the usual strain. Differences in infectivity for certain mosquitoes are found in strains of *P. elongatum* from different countries.

MANWELL (p. 328) argues that *P. oti* should be regarded as a synonym for *P. hexamerium* of the canary.

Other animals.—VINCKE and VAN DEN BULCKE (p. 522) describe the reaction of Congo tree rats to *P. berghei*. They (p. 523) have maintained a strain in white mice, in which it was always fatal unless treatment with aralen was given. The authors claim to have discovered exo-erythrocytic forms of the parasite in histiocytes and endothelial cells. In *Rattus rattus* this species gives rise to disease which is fatal in half the animals (p. 523). RODHAIN (p. 523) describes the behaviour of *P. berghei* in cotton rats. VAN DEN BERGHE *et al.* (p. 816) report the finding of tissue forms of *P. berghei*. SCHNEIDER and SCHNEIDER (p. 1182) comment on the absence of incubation period in *P. berghei* infections passaged through mice by the intraperitoneal route. GALLIARD and LAPIERRE (p. 1182) studied the blood changes in mice infected with *P. berghei*. Although infection with *P. berghei* induced in rats after splenectomy is fatal, GALLIARD and LAPIERRE (p. 1183) show that splenectomy after parasites have disappeared leads only to benign relapses.

SCHNEIDER *et al.* (p. 325) used *P. berghei* in mice for tests of certain drugs, obtaining results which differ considerably from those obtained with some other malaria parasites. This emphasizes the need to use different parasites in tests of chemotherapeutic activity. THURSTON (p. 1183) has tested various drugs on *P. berghei* infections of mice. SCHNEIDER and MONTÉZIN (p. 1066) have elaborated a technique by which infections of mice with *P. berghei* are standardized. Drugs acting on the parasite can therefore be tested under uniform conditions.

GARNHAM (p. 1067) has found exo-erythrocytic forms of a species of *Hepatocystis* in African fruit bats. MCGHEE (p. 215) contributes a note on the malaria parasites of bats found in the New Hebrides and the Philippine Islands.

Charles Wilcocks

MALARIA

SERGENT, Ed. Definition de l'immunité et de la prémunition. [**Definition of Immunity and Premunition.**] *Ann. Inst. Pasteur.* 1950, Nov., v. 79, No. 5, 786–97.

This contribution to the Jules Bordet Jubilee Number of the *Annales* usefully summarizes the conceptions of the workers at the Pasteur Institute of Algeria

on the subject of host-parasite relationships. Sergent begins by quoting CONDILLAC, one of the first encyclopaedists, " *L'art de raisonner se réduit à une langue bien faite* ", and demonstrates in the course of this paper that science also needs a language clear, exact, and precise, and when words do not exist, then they must be constructed.

When a microbe attacks the body, six things may happen :—

1. If the host possesses an " innate resistance " (a better term than natural immunity), then the microbe succumbs without more ado. An example is the refractoriness of man to the parasites of avian malaria.

2. The host succumbs after excessive multiplication of the parasite ; there is an incubation period and finally a " crisis " (or attack)—as in tetanus.

3. The parasite succumbs after unsuccessful conflict with the host ; the disease is cured first clinically then parasitologically, the victory of the host being assisted by the formation of humoral antibodies (" active acquired immunity "). These antibodies can be transferred to a new animal (including a child, transplacentally from the mother) to protect the latter passively against an onslaught by parasites of the same species.

4. The host is unable to shake off the invader completely ; there is an armed truce, the illness disappears but the infection continues in a " latent state " (occult, sleeping, torpid, silent, inapparent, sub-clinical, etc.). The infection now is almost commensal and is accompanied by what was once called a relative tolerance or immunity, infection or infestation immunity, etc., but is now widely known as " premunition ". This is characterized by (*a*) resistance to superinfection with the same strain or species, and (*b*) the disappearance of this resistance when the latent infection finally ceases. The distinction between immunity and premunition is neatly demonstrated by comparing scarlet fever and malaria—a person is immune to scarlet fever after he has had it, a person is premunized to malaria when he actually has the infection and only then. Premunition confers many benefits on the host, and it is necessary in certain circumstances, *e.g.*, in some trypanosomal or malarial infections, to avoid " disinfecting " the host from such a useful therapeutic agent (*i.e.*, the parasite itself). It is only the vertebrate host which exhibits premunition ; a mosquito on the other hand can contain three or more different infections say of *Plasmodium relictum*, all developing simultaneously. Malaria, tuberculosis, brucellosis, piroplasmosis and the spirochaetal diseases are examples of infections in which premunition develops.

5. The parasite may invade the host silently and no clinical effects may follow. This commensal relationship is designated " infection latency " (a better term than Nicolle's " inapparent infection ") and is seen in diphtheria and scarlet fever ; also congenitally in some infections of *Trypanosoma lewisi* ; *Theileria mutans* and *Anaplasma centrale*.

6. Lastly, no sort of resistance may be acquired by a host after cure of an acute attack—particularly of the pyogenic organisms (pneumococci, streptococci, gonococci, etc.). *P. C. C. Garnham*

SANI, A. L'endemia malarica del Basso Ferrarese dal 1940 al 1948. [**Endemic Malaria in the Lower Ferrara District from 1940 to 1948.**] *Ann. d. San. Pubblica.* Rome. 1950, July–Aug., v. 11, No. 4, 1149–61. English summary (10 lines).

From the beginning of the century up to 1940, malaria incidence in the Province of Ferrara underwent a progressive decline which had been only temporarily interrupted during the closing years of the first world war. In 1940 only 4 of its 20 communes reported cases of malaria ; these communes bordered

the Adriatic. As recently as 1934, 17 communes had reported malaria cases. In 1940 there were 978 cases notified, of which 414 were primary infections. In 1942 and 1943, there was increased prevalence due for the most part to an influx of people into the infected communes from the towns, but no extension of the infected area. In 1944, the province became the scene of active military operations, air attacks, bombardment, destruction of bridges, obstruction of waterways, etc. Malaria reached almost epidemic proportions. Notifications numbered 5,997 in 1945 and 6,888 in 1946. In June of the latter year DDT spraying of houses was begun and repeated in the two following years. The subsequent improvement was spectacular. In 1948 only 265 cases of malaria were recorded in the province ; none of these were primary infections. The author discusses the value of DDT residual spray, not the least of its merits being that its success is not dependent upon the goodwill and cooperation of the population protected. *Norman White*

GOODWIN, M. H., Jr. **Observations on the Recession of Malaria in an Area of Southwestern Georgia.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 651–61, 2 figs. (1 map). [10 refs.]

This is a record of observations on naturally acquired human malaria in a small area of South-Western Georgia during the ten years 1939–49. The area comprises adjacent sections of Baker and Early counties : substrata of soluble limestone facilitate the formation of ponds and pools, through subsidence. Such collections of water afford favourable breeding places for *Anopheles quadrimaculatus*. The population of the area is entirely rural, 7 houses per square mile. Observations were made over an area of about 400 square miles inhabited by about 9,000 people. Slightly less than 60 per cent. of the population were Negroes. It was found that the majority of foci of malaria were confined to an area of some 40 square miles ; this was kept under very close observation. Approximately 1,000 residents were visited weekly or biweekly throughout the period. When symptoms suggestive of malaria were noted blood films were examined.

When the observations started, malaria was on the decline throughout the South-Eastern States. The cyclic resurgence of malaria then expected did not materialize. The decline of malaria incidence in the small area reported on was even more precipitous than that recorded in other malarious areas of the country. In the intensively studied area there were 406 persons with symptoms of malaria in 1940 : *P. falciparum* was found in 114, *P. vivax* in 7. Not a single positive blood film was detected after 1944. There is no evidence that recession of malaria in this area was due to reduced anophelism. The causes are matters of conjecture. Treatment of cases with quinacrine [mepacrine] hydrochloride probably did much. The improvement of economic conditions enabled the population to apply individual control, prophylactic and curative measures. *Norman White*

DE BUSTAMANTE, F. M., LACERDA, N., PARACAMPOS, H. & SANTOS, O. O. A malária na bacia do médio São Francisco. [**Malaria in the Middle Reaches of the San Francisco River.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Jan., v. 1, No. 1, 4–18, 3 figs. (maps) & 5 graphs.

The San Francisco River rises in the State of Minas Gerais, flows northward through the State of Bahia, parallel to and some 600 kilometres inland from the Atlantic coast, and then turns eastward and flows into the Atlantic between the States of Alagoas and Sergipe. The total length of the river is 3,161 km. The middle stretch of the river with which this report is concerned runs from

Pirapora, at the junction of the River Velhas with the main stream, 1,370 km. northward to Joazeiro. All of this middle San Francisco River is navigable, as are the large tributaries which flow into it from the west, the Paracatu, Urucuia, Carinhanha, Corrente and the Grande Rivers. Most of the tributaries which reach its right bank are periodic in flow.

The total area of the *municipios* in the middle San Francisco basin with which this study is concerned is 247,256 square kilometres ; they have a population of 545,293. There are 26 *municipios*, 5 of which are in Minas Gerais, 20 in Bahia and one in Pernambuco States. Most of the population live near the banks of the river or its tributaries. There is a great difference in the water level in the wet and dry seasons—5 metres difference in average years, 8 to 10 metres in flood years.

The density of the population is very low, 2·2 per square kilometre ; it is 1·6 in Minas Gerais and 3·4 in Bahia. The predominant ethnic type is *mestiço*, resulting from a mixture of white with Indian and a varying proportion of Negro blood. The whites are in a minority but they control the commerce and local administration. Of the 9,539 children of school age examined to determine spleen rates 21·80 per cent. were white, 15·45 per cent. were Negro, and 62·75 per cent. *mestiço*. The standard of life is low, especially among the rural population which depends for the most part on agriculture and fishing for its livelihood. Evidence of malnutrition is common. Agricultural methods are very primitive. Housing is miserable. Conditions in the towns are much better. The houses of the rich in the centre of some of the towns are endowed with every comfort. All the towns have primary schools and in three, Barra, Petrolina and Januaria, Catholic Colleges provide secondary education.

The river and its chief tributaries provide the chief means of communication. Road and railway connect both ends of the Middle San Francisco with the coast. Three Aviation Companies have services which call at places in the Valley.

Medical assistance is inadequate ; doctors are few and far between. The few small hospitals are ill equipped. Plans have been prepared for the construction of several large hospitals at strategic points.

Other than malaria the most important diseases of the region are helminth infections, venereal diseases, especially syphilis and gonorrhoea, dysenteries and typhoid fevers : the last are endemic throughout the area. Trachoma also occurs. Cases of kala azar and schistosomiasis have been reported. [Further information is expected.] *Norman White*

BÜTTIKER, W. Beitrag zur Kenntnis der Biologie und Verbreitung einiger Stechmückenarten in der Schweiz. [**Contribution to the Knowledge of the Biology and Distribution of certain Species of Mosquitoes in Switzerland.**] *Mitt. Schweiz. Ent. Ges.* 1948, v. 21, Pt. 1, 1–148, 46 figs. [102 refs., [Summary taken from *Rev. Applied Entom.* Ser. B. 1950, Oct., v. 38] Pt. 10, 168.]

The mosquitoes dealt with are *Culex pipiens*, L., *Aëdes vexans*, Mg., *A. geniculatus*, Ol., *Anopheles claviger*, Mg. (*bifurcatus*, auct.) and *A. maculipennis*, Mg. In the introduction, the systematics and importance of mosquitos are discussed, and notes are given on the world distribution and bionomics of the five species concerned. The only varieties of *A. maculipennis* found by the author in Switzerland were *typicus*, *messeae*, Flni., and *melanoon*, Hackett ; their local distribution is given, together with the dimensions and patterns of the eggs.

Observations on the effect of abiotic factors on development and behaviour were carried out in the laboratory in 1946 and 1947, and the results are

discussed with reference to the literature. The breeding technique is described in detail. Hens and guineapigs were the main sources of blood-meals, and date-pulp in a little water was found to be an excellent supplementary diet. Ground dog discuits and powdered liver proved suitable food for the larvae.

The following is mainly based on the author's summary of the results. At 18°C. [64·4°F.], the minimum preoviposition periods of *C. pipiens* and *A. m. messeae* lasted 5 and 3·5 days. At 22°C. [71·6°F.] development from hatching to adult emergence lasted 10·4, 10, 18·3 and 16·7 days for *C. pipiens*, *Aëdes vexans*, *A. geniculatus* and *Anopheles maculipennis*, respectively. Records of the duration of development of mosquitos from individual batches of eggs showed that males of *C. pipiens* and *A. m. messeae* begin to emerge 1–1·5 and 2 days before the females. Temperature preferences differed with stage and species. Thus, larvae of *C. pipiens* congregated in sections of a thermal gradient in which the temperature of the water was 21–25°C. [69·8–77°F.], those of *A. m. typicus* preferred 21°C., and those of *A. claviger* 20–23°C. [68–73·4°F.]. The temperature preference did not change in the course of larval development. The adults of *C. pipiens* preferred temperatures of 30–32°C. [86–89·6°F.] in summer and 2–6°C. [35·6–42·8°F.] in winter. The effect of temperature on the activity of larvae, pupae and adults of the different species was similar, and the curves representing it agreed fairly closely. None of the larvae or pupea survived freezing in water, but the larvae of *A. claviger*, which is a cold water species, showed slight activity at 0°C. [32°F.] and considerably more at 4–8°C. [39·2–46·4°F.].

Unfed females of *C. pipiens* and *A. m. messeae* lived longest (about 4 and 12 days, respectively) at −2 to 2°C. [28·4–35·6°F.] and 100 per cent. relative humidity. At 5°C. [41°F.] and 100 per cent. humidity, unfed freshly emerged females of *A. m. messeae* lived for 10 days, and those fed on fruit juices lived for 40 days. Overwintered females of *C. pipiens* transferred at the end of February to a temperature of 17–18°C. [62·6–64·4°F.] all died in 36 hours when the relative humidity was 7–8 per cent., but survived until April or May when it was 100 per cent. Overwintered females of *A. m. messeae* survived from March to July–September when kept at 100 per cent. relative humidity and a temperature of −2 to −3°C. [28·4–26·6°F.].

Details are also given on the effects of different types of electro-magnetic radiation on the larvae of *A. maculipennis*, on the phototactic reactions of larvae, pupae and adults of *C. pipiens* and *A. m. messeae*, and on the depths to which larvae of the various species could dive when disturbed and the periods for which the larvae and pupae could remain below the surface of the water.

REID, J. A. & HODGKIN, E. P. **The *Anopheles umbrosus* Group (Diptera : Culicidae). Part I : Systematics, with Descriptions of Two New Species. Part II : Biology and Transmission of Malaria.** *Trans. Roy. Entom. Soc. of London.* 1950, Dec. 15, v. 101, Pt. 9, 281–334, 15 figs. [60 refs.]

I. Mr. Reid deals with the systematics of the *Anopheles umbrosus* group, which is defined as comprising members of the series *Myzorhynchus* of which the larvae have few or no palmate hairs on the abdomen. The group is largely confined to the Malaysian region (Malay peninsula, Sumatra, Borneo and Java) : only *A. baezai*, which is a coastal species, breeding in brackish water, ranges widely outside this area. (It occurs sparingly in Indo-China, the Philippines and Celebes.)

Though very similar, the members of the group can be separated by good specific characters. Reid gives descriptions of all stages of nine species, two

of them new. He finds *novumbrosus* Strickland to be a synonym of *umbrosus* Theobald, while the species generally called "*umbrosus*" in the past is now *letifer* Gater.

II. Mr. Hodgkin describes the biology of the group and their relation to malaria. The larvae are found in stagnant or slowly moving water, usually on the acid side of neutrality, seldom exposed to the sun and often in deep jungle shade. *A. baezai* is restricted to a narrow coastal belt ; it prefers brackish water, from fresh, up to water as salt as the sea. *A. letifer* occurs in pools and drains in cultivated land on the plains ; *umbrosus* in jungle swamps on the plains, *roperi* in the foothills and *separatus* scattered throughout much of this range, outside the jungle.

Hodgkin summarizes data from precipitin tests on mosquitoes taken from human traps, etc., and concludes that *letifer* and *umbrosus* feed readily on man and this is probably also true of *baezai* and *roperi* ; on the other hand, *separatus* tends to be zoophilic.

A series of records of dissections are recorded and assessed in the light of possible past confusion of identification and changes in technique. It is concluded that *letifer* is an efficient vector of malaria, and, under present conditions, it is probably the most important species of the group in Malaya. *A. umbrosus* is capable of being a serious vector, but it is limited by its restriction to jungle swamp and the immediate vicinity. The status of *baezai* is uncertain. It is difficult to infect this mosquito artificially, but captured specimens often have high infection rates. However, it is possible that some of these wild infections are not due to human malaria. On the whole, *baezai* should be dangerous in localities where it is very abundant. There are also epidemiological grounds for suspecting *A. roperi*, when it is common. *A. separatus* does not seem to carry malaria in Malaya. *J. R. Busvine*

VAN HELL, J. C. Iets over de Anophelinen fauna van Zuid-Celebes met vermelding van de malaria-overbrengsters in dit gebied. [**On the Anophelines of Southern Celebes, with reference to the Vectors of Malaria.**] *Med. Maandblad.* Djakarta. 1950, Nov. 1, v. 3, No. 11, 379–94. [12 refs.]

Twenty-five species or varieties of *Anopheles* have been found in Southern Celebes. Their geographical distribution is tabulated. They are Oriental species, and there is no Australasian element among them.

An unusual number of species are proved to be vectors of malaria, natural infection-rates being tabulated : they are *Anopheles sundaicus, ludlowi* var. *torakala, barbirostris, hyrcanus, subpictus, minimus* var. *flavirostris* and var. *varuna, leucosphyrus* var. *hackeri* and *barbumbrosus*. Several other species occur and may be supposed to be vectors though they have not proved to be so in Celebes. *P. A. Buxton*

LAIRD, M. **Some Natural Enemies of Mosquitoes in the Vicinity of Palmalmal, New Britain.** *Trans. Roy. Soc. New Zealand.* 1947, v. 76, pt. 3, 453–76, 10 figs. [35 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1950, Oct., v. 38, Pt. 10, 166.]

The following is almost entirely based on the author's summary of this account of observations on the value of various aquatic Arthropods and some other animals as agents in the natural control of mosquitos made during a mosquito survey at Palmalmal, Jacquinot Bay, New Britain, in 1945. The two Anophelines found were *Anopheles punctulatus*, Dön., which bred chiefly in temporary pools that had no predacious macrofauna, and *A. farauti*, Lav.,

which bred chiefly in permanent ones. The findings indicated that larvae of *Culex halifaxi*, Theo., and of Zygoptera and adults of *Gyrinus sericeolimbatus*, Rég., the Hygrobatid mite, *Limnesia jamurensis*, Oudm., and perhaps of various species of Gerrids are among the most effective predators of Anopheline larvae. The Dytiscids, *Hydaticus litigiosus*, Rég., and *Copelatus* sp., the Notonectid, *Enithares bergrothi*, Mont., and *Orthetrum villosovittatum*, Br., and other Anisoptera are of less value against Anophelines, but they feed extensively on other mosquito larvae. Spiders of the genera *Epeira* and *Meta*, which spin webs over breeding pools, are of some importance as predators on adult mosquitos, as also are bats and the house gecko, *Gehyra oceanica*. *Megarhinus inornatus*, Wlk., which breeds in coconut husks and small artificial containers, might be used for the control of members of the group of *Aëdes scutellaris*, Wlk., as their immature stages occur in the same type of breeding places. It is the only predator discussed in this paper that may be of more than purely local importance.

The introduction of *Enithares begrothi* into metal tanks and drums in the Jacquinot Bay area should provide a means of controlling domestic species when other methods are undesirable. It is pointed out that there may be enough predators in certain permanent pools to maintain effective control of Anophelines, and that treatment of these pools with such larvicides as DDT would probably destroy the predators and, unless treatment was repeated frequently, allow Anophelines to establish themselves in pools that had formerly been of little importance.

BLACK, R. H. **Anophelism without Malaria in Northern Australia : a Malaria Survey of Part of the Northern Territory and the East Kimberleys District.** *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 207–11, 7 figs. on 2 pls. & 1 map.

This extensive area of Northern Australia (15° S. 130° E.) is cattle-raising and mining country with a small population—mainly aborigines. A map shows clearly the route of the survey, the river systems involved and the distribution of anopheline species. Over the last 50 years outbreaks of severe malaria with heavy mortality have occurred. In the present survey 121 white and 1,382 coloured persons were examined at 44 localities. Palpable spleens were found only in 9 aborigines (1 per cent. of children). Enlarged liver was demonstrated in 12 per cent. of the whites and 16 per cent. of the aborigines. All blood films, thick or thin, were negative.

From 27 localities adults of three anopheline species were found, namely : *A. annulipes*, *A. amictus amictus* and *A. bancrofti bancrofti*. From 57 localities were recovered the larvae of the same anophelines and of *A. amictus hilli*. In this generally arid type of terrain breeding places were limited to hoof-marks at water-holes, soakage-holes in dry river beds, bore-tanks, drainage and ornamental pools at homesteads, and permanent water-holes in rivers. Photographs are included.]

These species of anophelines have been shown experimentally to be capable of transmitting malaria, so the area is potentially malarious. Development of this territory with increase in potential breeding places and introduction of gametocyte carriers and possible infiltration by the known malaria vector, *A. punctulatus farauti* [*moluccensis*], from the east may result in endemic malaria.

[The reader may well refer to the paper by FORD on the malaria problem in Australia, this *Bulletin*, 1951, v. 48, 4.] *R. Ford Tredre*

Rachou, R. G., Ricciardi, I. & Guedes, A. S. Registro de algumas espécies de anofelinos no Paraguay. [**Account of some Species of Anophelines found in Paraguay.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, July, v. 2, No. 3, 231–3.

The English summary appended to the paper is as follows :—

" In this paper the authors record nine species of anophelines they found in Paraguay, where they worked from November 1945 to February 1946. They have visited 27 localities of this country, distributed by 3 departments (Guaira, Caapaza, Central) having collected 6,295 larvae and 143 adult anophelines."

Wozonig, H. Eiweisskörper und Kolloidreaktionen im Liquor bei natürlicher Malaria. [**Protein Content and Colloid Reactions in the Cerebrospinal Fluid in Naturally Acquired Malaria.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1949, July 15, v. 106, No. 4, 329–38, 1 fig. [14 refs.]

The changes occurring in the protein content of plasma and cerebrospinal fluid during naturally acquired *P. vivax* and *P. falciparum* malaria are discussed. The scanty literature is reviewed and the author's own findings in 133 cases of *P. vivax* and 46 of *P. falciparum* malaria are given in detail. Twenty-three cases of *P. vivax* malaria had a protein content in the cerebrospinal fluid of 1·5 or more times normal. In these cases the globulin/albumin quotient was below normal, owing mostly to increase in albumin and to some extent to fall of globulin. The concentration of albumin was maximal in the post-febrile stage of the disease and returned to normal 13 to 19 days after the fever had subsided. The globulin, which was depressed during the acute attack, began to increase 4 to 8 days after recovery and continued to rise until the normal ratio with albumin was re-established.

The author believes that in *P. vivax* malaria there is not much change in the permeability of the blood-brain barrier ; the finely dispersed albumin passes from the plasma to the cerebrospinal fluid, while the more coarsely dispersed globulin cannot.

In *P. falciparum* malaria the protein in the cerebrospinal fluid increases at an earlier stage than in *P. vivax* infections and the increase is chiefly in the globulin fraction. He considers that this indicates an increase in the permeability of the blood-brain barrier possibly because of an acute meningitic reaction (indicated by the increase in cellular content of the fluid which occurs more commonly in *P. falciparum* than in *P. vivax* malaria).

The rise in protein in the fluid is reflected, in both kinds of malaria, in the colloid reactions of the fluid. The strongest reactions occur in the post-febrile period (after therapy) in both *P. vivax* and *P. falciparum* malaria, but the reactions are weaker in the latter, in spite of its greater severity and liability to cerebral complications.

The reactions in the cerebrospinal fluid at a given time during or after malaria correspond roughly to the prevailing erythrocyte sedimentation rate, which is itself dependent on the plasma protein content and distribution ; there is thus a relation between the plasma and cerebrospinal fluid changes.

B. G. Maegraith

Wozonig, H. Permeabilitätsverhältnisse der Blutliquorschranke bei natürlicher Malaria. [**Permeability of the Blood-Brain Barrier in Natural Malaria.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1949, Aug. 30, v. 106, No. 5, 416–26. [16 refs.]

The permeability of the blood-brain barrier was examined in naturally acquired malaria by comparing in the blood and c.s.f. [cerebrospinal fluid]

(i) the sugar content ; (ii) the Wassermann reaction, and (iii) the haemolysin (sheep cells) reaction (absent in normal c.s.f.). No evidence of altered permeability in either *P. vivax* or *P. falciparum* malaria was obtained. Walter's bromine concentration test was also carried out. [Bromine concentrates three times as high in the blood as in the c.s.f. ; any drop in this ratio indicates a relative increase in bromine in the c.s.f. and thus, according to the author, an increase in permeability of the blood-brain barrier.] The normal bromine permeability quotient is 3·0. None of 13 *P. vivax* cases showed quotients of less than normal, but five of 20 cases of *P. falciparum* malaria had quotients of less than 3·0 (ranging from 2·95 to 2·82).

The author concludes that in these five cases there was some increase in permeability of the blood-brain barrier. He also suggests that there was some relation between the appearance of this change in permeability and the nervous state of the patients, since four of them showed disturbances of consciousness. [There is insufficient evidence quoted to support this claim, or the equally unimpressive statement to the effect that complications such as "nephritis" have no effect on the permeability of the barrier.] *B. G. Maegraith*

Pizzillo, G. Sindromi emorragiche da malaria. (Porpora emorragica—emorragie retiniche.) [**Haemorrhagic Syndrome in Malaria ; Purpura Haemorrhagica ; Retinal Haemorrhage.**] *Riv. di Malariologia.* 1950, Oct., v. 29, No. 5, 321–30, 3 figs. [21 refs.] English summary (4 lines).

The author gives clinical notes of three cases. A man aged 32, in a good state of nutrition, developed a diffuse cutaneous haemorrhagic eruption during an acute attack of *P. falciparum* malaria : he was not very seriously ill. The two other patients, both young male adults, each developed a retinal haemorrhage, with temporary loss of vision, during attacks of *P. vivax* malaria. All three patients responded well to Ascoli's treatment, adrenaline, quinine and vitamin C, and made complete recoveries. *Norman White*

Quevauviller, A. Nouvelle contribution à l'étude des sels de quinine : analyse capillaire. [**Capillary Analysis, a New Contribution to the Study of Quinine Salts.**] *Rev. Paludisme et Méd. Trop.* 1950, Dec. 15, v. 8, No. 79, 281–90. [20 refs.]

van Goor, W. T., Lodens, J. G. & Gomez, J. A. **Clinical Prophylaxis with Proguanil and Nivaquine in a Community in Java.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Dec., v. 2, No. 4, 341–9, 2 graphs. [15 refs.]

In a previous publication [this *Bulletin*, 1950, v. 47, 807] the two senior authors reported the results of one year's prophylaxis of malaria in a community in West Java with proguanil and Nivaquine B [chloroquine]. The paper under review records the results of a second year's prophylaxis with the same two drugs in the same locality. In one village 200 mgm. proguanil were given once a fortnight from August to December 1948 and thereafter 200 mgm. once weekly until June 1950. For the first few months the results were favourable, parasitaemia decreasing from 90 to 6 per cent. and the spleen rate from 84 to 14·5 per cent. After about six months, however, parasitaemia began to increase, rising to over 60 per cent. at the end of 12 months. At first only *P. falciparum* infections showed an increase, but latterly there was a rise in *P. malariae* infections also. During the second year the spleen rate rose to 58 per cent. The authors attribute these findings to a gradual development of resistance of *P. falciparum* and *P. malariae* to proguanil. This conclusion was

supported by certain subinoculation and therapeutic tests, which showed that in one case *P. falciparum* had become resistant to 300 mgm. proguanil daily, and in another *P. malariae* had become resistant to 600 mgm. proguanil daily.

In the second village, 200 mgm. proguanil were given once a fortnight from August 1948 to May 30 1949, after which it was substituted by Nivaquine B once a week. Fourteen days after the change, the asexual parasitaemia dropped from 55 to 1 per cent. When the drug was discontinued during the month of Ramadan, there was a marked increase in all species of plasmodia, but resumption of treatment with 200 mgm. over a period of 10 months kept parasitaemia at a very low level, never higher than 3 per cent.

In two schools where 200 mgm. Nivaquine were given weekly to 500 children for 15 months, parasitaemia, which was originally 35 per cent., remained at zero for the whole of the observation period.

No unpleasant side-effects were observed from the administration of either drug during the whole course of the experiments. *G. Covell*

CODA, D. Quimioprofilaxia na malária. Resume dos trabalhos da assisténcia quimioprofilática prestada às tropas do exército acantonadas no litoral do Estado, durante a guerra. [**Résumé of Chimoprophylaxis of Malaria among Troops stationed along the Coast of São Paulo during the War.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 151–7. English summary.

This paper covers the same ground as that abstracted in this *Bulletin*, 1950, v. 47, 207.

MARA, L. Considerazioni sulle possibilità di lotta antimalarica a Tessenei. [**Possible Malaria Control Measures in Tessenei.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1950, v. 10, Nos. 1/2, 26–44, 7 figs. English summary.

In a previous publication the author described the malaria epidemiology of Tessenei, an agricultural development area on the south bank of the River Gasc, in the extreme west of Eritrea close to its frontier with the Anglo-Egyptian Sudan [this *Bulletin*, 1950, v. 47, 948]. In this paper he discusses the malaria control measures that are likely to give the best results. *Anopheles gambiae* is the vector. The conclusions he reaches are that in the irrigated areas antilarval measures would be costly, difficult to carry out, and little likely to be effective. Residual DDT spraying should be effective. Antilarval measures in and around the village of Sabot, however, would be both feasible and economic. During the early years of the campaign infected persons should be adequately treated with one or other of the new synthetic drugs : the prophylactic use of such drug should also be considered. *Norman White*

OLIVIER, L. J. G. **Organised Malaria Control—Northern Transvaal.** *Pub. Health.* Johannesburg. 1950, Dec., v. 14, No. 12, 375–9.

" A malaria-free island in a continent is being maintained in the Union of South Africa". The extermination of the disease threatening the richest agricultural tracts has added " a fifth province " to the Union. The Malaria Organisation of the North Transvaal before 1944 had determined the basic facts that 98 per cent. of malaria was due to *P. falciparum* with its inherent tendency to die out in the human host within two years in the absence of re-infection ; that *A. gambiae* is the vector of summer epidemics and *A. funestus* is confined to the endemic low-veld areas. A malarious area of 40,000 square miles has a population of 100,000 Europeans and 1¼ million Africans. The control measures consist of either larval control, adult control or a combination

of both and are governed by local conditions and entomological findings. DDT emulsion is used as a larvicide and the usual formulations of DDT for adult control.

Climatic conditions have a marked effect on the annual density of vector mosquito populations, but in one part of the Transvaal, the Pietersburg zone, control measures are as follows : Larval and adult control, 1,470 sq. miles ; larval control only, 120 sq. miles ; adult control only, 1,910 sq. miles ; no control 1,800 sq. miles.

Larval control should constitute the bulwark of a well-directed malaria campaign and is applied mainly in the winter nurseries of the vector mosquitoes, in densely populated areas and areas of known high endemicity. In sparsely populated areas, adult control is the most economical measure. If winter larval control is reasonably efficient, build-up of vector population is delayed in the summer so that a single application of DDT as an adulticide will suffice for the season. The staff of European health inspectors and African malaria assistants is a mobile one and their precise activities from month to month are dictated by entomological circumstances determined by survey under the variable climatic conditions.

[The malarious parts of the Northern Transvaal (22°–25° S., 30° E.) are along the southern limits of the habitat of *A. gambiae* and *A. funestus* ; altitude and rainfall are important factors in dissemination of the vectors ; incidence of malaria is mainly seasonal and may be epidemic in character. At the limits of its habitat invasion of fresh territory is characteristic of *A. gambiae* as exemplified in the Natal epidemics of the early 1930s, and the Nile Valley epidemics of the war years. It was in Natal that the principle of adult mosquito destruction as a sole measure of control of epidemic malaria was established by the use of pyrethrins.] *R. Ford Tredre*

DOWLING, M. A. C. **Malaria Eradication Scheme, Mauritius.** *Nature.* 1951, Jan. 13, 67–8.

Mauritius is an island of 720 sq. miles with a population of 450,000 persons. Malaria was introduced in mid-19th century and is transmitted by *A. funestus* and *A. gambiae*. The former vector is most important as it breeds throughout the year, whereas *A. gambiae* flourishes only during the hot season (January–May).

A large-scale experiment in malaria eradication was started in Mauritius in 1948. The plan was to determine whether adequate mosquito control could be obtained, in the first place, by island-wide house spraying alone. It was originally intended to make a comparison between the effectiveness of different insecticidal treatments, but this part of the trial lapsed in 1950, largely owing to financial considerations. The treatments used were DDT in kerosene, DDT suspension and BHC suspension. The first spraying was done January–May, 1949, and covered some 76,000 buildings of all types. A second spraying treated 58,000 houses in August–December, 1949.

The results of spleen and parasite surveys are as follows :—

Survey	No. children examined	Spleen rate per cent.	Parasite rate per cent.
I Before spraying	3,585	34·8	9·5
II After 1st spraying	12,105	15·3	2·4
III After 2nd spraying... ... (not yet finished)	7,724	3·2	0·36

This evidence of malaria reduction is supported by records of vital statistics.

	Total annual death rate	Infant mortality rate
Mean rate 1934–48, per 1,000 ...	27·2±3·37	150·0±19·2
Range	20·1–36·1	113·9–188·0
Rate for 1949	16·6	91·0

A further series of figures of parasite rates among newly born infants confirms the evidence that malaria transmission has been reduced to a very low degree.

An interesting problem emerges from entomological data collected during the campaign. As might be expected, the numbers of mosquitoes in houses used as catching stations have declined steeply since spraying.

	No. houses " flitted "	*Anopheles gambiae*	*Anopheles funestus*	*Aëdes aegypti*
Before spraying ...	7,767	2,486	31,196	1,716
After spraying ...	76,246	703	474	1
Reduction per cent ...	—	97·12	99·85	99·94

It will be noted that *Anopheles funestus* and *Aëdes aegypti* have declined more than *Anopheles gambiae*. This is supported by larval surveys which show that *A. funestus* has apparently disappeared, whereas *A. gambiae* is still breeding plentifully. The latter mosquito is also found in newly-built, unsprayed houses and cattle sheds : this suggests that the DDT spraying repels it from houses (unlike *Anopheles funestus* and *Aëdes aegypti*, which are not deterred and get killed). Nevertheless, the total effect is suppression of malaria.

J. R. Busvine

BERTRAM, D. M. **A Critical Evaluation of DDT and ' Gammexane ' in Malaria Control in Upper Assam over Five Years, with particular reference to their Effect on** *Anopheles minimus*. *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 242–54, 5 figs.

Anopheles minimus is believed to feed every second night and therefore cannot become infective before its fifth blood meal ; in consequence, before it can transmit malaria where dwellings are treated with residual insecticide, it must survive on five separate occasions the hazard of entry to such treated dwellings. To determine the most suitable and efficient formulation for this purpose the author tested by routine methods solutions of DDT in kerosene (5 and 1 per cent.) and similar strength emulsions of DDT in medium kerosene extract (Assam Oil Company) ; also similar solutions and emulsions of " Gammexane " in the form of crude hexachlorocyclohexane, containing 12 per cent. of the active *gamma* isomer. In the preparation of these formulations the content of insecticide was adjusted to enable the application of all the insecticides in the formulations used to be at the rate of 1 gallon per 1,000 sq. feet of surface area. Groups of four huts of the mud-wall type were selected, two being treated with insecticide and two left as controls. Mosquito catches were made every fifth day by lethane 384 spray ; this was used because it left no residual or repellent effect. The results for the ensuing four months are tabulated, indicating the hut populations of *A. minimus*, *A. vagus* and culicines at the times of spraying with lethane 384, which always took place in the

afternoon. These experiments revealed several points of difference in the action of DDT and of " Gammexane ".

(1) The duration of effectiveness of DDT varied very considerably with different species. The effect of " Gammexane " on all species showed little variation.

(2) Emulsions or increased doses of DDT very markedly increased the duration of effectiveness. With " Gammexane " little change was recorded with alterations in dosage or form of application.

(3) With corresponding doses the duration of the effectiveness of DDT was longer than that of " Gammexane ".

(4) Against *A. vagus* and culicines the action of " Gammexane ", particularly in weaker doses, was noticeably superior to that of DDT.

(5) One per cent. " Gammexane " in emulsion, which is effective for two months against all species, seemed slightly superior in all-round effect to 1 per cent. DDT in emulsion, despite the extreme sensitivity of *A. minimus* to the DDT preparation. The marked sensitivity of the fierce biting culicines to low doses of " Gammexane " suggested that, other things being equal, the 1 per cent. emulsion might increase the comfort of the labourers' living conditions more than the corresponding DDT emulsion.

Emulsions were considerably more effective than the corresponding kerosene solutions, *e.g.*, 1 per cent. DDT emulsion caused a reduction in numbers of *A. minimus*, the malaria vector, by 90 per cent. or more for four months.

Similar experiments were carried out with suspension sprays of 1 per cent. Geigy DDT powder and " Gammexane " P. 520 giving residual dosage of 45 mgm. of DDT and 11 mgm. of *gamma* BHC per square foot respectively. Similar results were obtained at a reduced cost.

Experiments were conducted to determine results from treatment of portions of huts, namely (*a*) inside walls, (*b*) ceilings, and (*c*) a 12-inch band round both the outside and inside of the eaves, which is the general route of entry and exit of mosquitoes. For (*c*) 1 per cent. DDT emulsion, 1½ per cent. DDT suspension and 6 per cent. BHC P.520 were effective for two months against *A. minimus* ; the BHC preparation was almost equally effective against *A. vagus* and the culicines, but DDT was considerably less effective. For (*a*) and (*b*) 1 per cent. DDT was effective for four months against *A. minimus*, but not so satisfactory against *A. vagus* and culicines.

On one tea estate complete treatment with 1 per cent. DDT during two successive mosquito seasons was accompanied by only small reductions in the general malaria rate and in the spleen rate of children of 2 to 10 years. Therefore the possibility had to be considered that mosquitoes might enter a hut, obtain a blood feed and depart without contact with insecticide. With the use of the technique of Muirhead Thomson's experiments in East Africa [this *Bulletin*, 1950, v. 47, 439] tests were made of " Gammexane " P.520 (11 mgm. *gamma* BHC per sq. foot), and Geigy DDT suspensions (45 and 215 mgm. DDT per sq. foot). A table shows the results of complete residual treatment of three pairs of huts fitted with mosquito window traps ; these results were confirmed by a series of five similar experiments [no figures quoted]. In the table mosquitoes are not specified but the proportion of anopheline to culicine was 3 : 2, the anophelines being almost entirely *A. minimus* ; the numbers recorded are the totals of daily collections over a period of six weeks from the time of treatment. With " Gammexane " no mosquitoes survived, 645 were dead on the floor of the huts and 41 dead in the window-trap ; with the weaker DDT suspension (1 per cent.) 461 survived in the window-trap, 9 died in the trap and 58 were dead on the floor ; with the stronger DDT suspension 215 survived in the window-trap, 7 died in the trap and 733 were dead on the floor. The percentages of survivals over 24 hours were therefore : " Gammexane "—nil ;

DDT (45 mgm. per sq. ft.)—86 ; DDT (215 mgm. per sq. ft.)—22·5. None of the survivors showed evidence of a blood meal. It is concluded that DDT has an excitatory effect and " Gammexane " has not ; in consequence for the control of *minimus* malaria DDT can be no more recommended than it can for the control of *gambiae* malaria.

The comparative costs for the complete treatment of a tea-garden comprising 800 mud-walled thatched huts are as follows (Rs. 1,000=£75) :—

1 per cent. DDT in suspension	4 treatments	...	Rs. 2,400
5 " " " " "	2 "	...	Rs. 6,000
" Gammexane " P.520	4 "	...	Rs. 1,770

[The conclusions seem to be a rather sweeping condemnation of DDT based on 42 days' observation in the " excitatory " experiments ; the average daily catch in each of these appears to be 16, 13 and 23 respectively, of which approximately 40 per cent. were culicine. It is unfortunate that the figures for the subsequent confirmatory experiments are not quoted. In Africa, Muirhead THOMSON used a DDT dosage of 400 mgm. per sq. foot ; 98 per cent. of *A. gambiae* survived 24 hours in the window-trap, as compared (in Assam) with 22·5 per cent. of all mosquitoes after the use of 215 mgm. DDT per sq. foot.

Treatment (per sq. foot)	Mosquitoes collected				Mosquitoes in trap surviving 24 hours	
	Dead on floor of hut	Dead in trap	Alive in trap	Percentage alive	Numbers	Percentage survival
Muirhead THOMSON, Africa *A. gambiae* : 24 mgm. gamma BHC ...	706	77	1	1	0	0
400 mgm. DDT ...	11	0	553	98	254 of 258 blood-fed examinees	98
BERTRAM, Assam. All mosquitoes (57 per cent. anophelines) 11 mgm. gamma BHC ...	645	41	0	0	0	0
45 mgm. DDT ...	58	9	470	87·5	461	86
215 mgm. DDT ...	733	7	215	22·5	215	22·5
GILROY, Assam Anophelines : 10 mgm. gamma BHC	50	59	104	49	8	4
45 mgm. DDT ...	5	33	56	60	2	2
90 mgm. DDT ...	0	19	37	66	2	4

Working in Assam under similar conditions to the author's, GILROY [referred to by MACDONALD, this *Bulletin*, 1951, v. 48, 17], using a similar dosage of BHC, records 49 per cent. of anophelines alive on examination of the window trap, but only 4 per cent. survived 24 hours ; with 90 mgm. DDT dosage 66 per cent. were alive in the trap, but only 4 per cent. survived 24 hours. Although the numbers of mosquitoes are small in Gilroy's table the results do suggest that there is little difference in the lethal power of DDT and BHC against the malaria vectors in Assam ; if anything BHC appears to kill more quickly than DDT. As MACDONALD [*loc. cit.*] observes commenting on the present authors' preliminary account of this work [this *Bulletin*, 1950, v. 47, 814], " Both of these insecticides may be of great value in Assam, and ultimately it might prove desirable to alternate them. It would be regrettable if either of them were to be condemned without very full trial and independent repetition of work to confirm results, such as is now being made in the case of Muirhead THOMSON's work on DDT in the control of *A. gambiae* in Africa ".]

R. Ford Tredre

BERTRAM, D. M. **Larvicidal Treatments with DDT and ' Gammexane ' in Upper Assam, with particular reference to their Effect on** *Anopheles minimus*. *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 255–9.

These experiments with DDT are a confirmation of the original work by RIBBANDS [this *Bulletin*, 1946, v. 43, 409, 1014], part of which was carried out in the same area. Weekly application of 5 per cent. DDT in Malariol, not by continuous spray but by individual discrete dosage, is an effective larvicide in flowing water. The amounts of oil used [shown in fluid drachms or gallons] depend on width of stream and rate of flow. The author obtained the following results [comparable results by Ribbands are in brackets] :—

5 per cent. DDT in malariol	Width in feet	Rate of flow : Feet per minute	Distance of 100 per cent. Reduction in numbers of larvae
3 fl. dr. [2·8] ...	2	12	100 ft. [300 ft.]
6 fl. dr. [5·6] ...	4	38	300 ft. [900 ft.]
2 gallons	35 [30]	90 [75]	1,500 yds. [2,280 yds.]

For still water 100 per cent. reduction of larvae was demonstrated on the day after the application of 5 per cent. DDT in oil at a dosage of $\frac{1}{4}$ gallon per acre. [Ribbands used $\frac{1}{8}$ gallon per acre.]

The author obtained similar results with similar dosages of 2 per cent. " Gammexane " liquid concentrate LG 140. *R. Ford Tredre*

NAIR, C. P. **DDT as a Residual Insecticide against** *A. letifer* **and** *A. maculatus* **in Malaya.** [Correspondence.] *Nature*. 1951, Jan. 13, 74–5. [10 refs.]

As an experiment in a hyperendemic malarious village (*Anopheles letifer* area) in Malaya, the author sprayed all interior and exterior walls of habitations with a 5 per cent. solution of DDT in kerosene, three times in four months, at the rate of 100 mgm. per sq. ft. Mosquito collections were made regularly afterwards by day, and in some of the houses, sheets were spread out to trace mosquitoes dying in them.

There was a complete absence of mosquitoes for 2 to 4 weeks, after which they gradually returned. Then the numbers remained low (average anopheline catch per night was 2·7 as compared with 25 in a comparison station) and the numbers engorged were lower than in the control station (0·32 as compared with 12). There was also a partial mortality of mosquitoes caught in treated houses, at this stage, if kept for 4 to 16 hours. However, there was no evidence that the house spraying reduced larval breeding in the neighbourhood.

The author states that the spleen rate of the treated village was reduced from 63·5 to 39·5 and the parasite rate remained constant; whereas the spleen rate remained constant in a comparison area, while the parasite rate rose. No indication of the period of the experiment or numbers sampled are given.

In a group of houses in the *Anopheles maculatus* area which were sprayed on the outside only, the mosquitoes returned to 16 per cent. of pre-spray catch in 3 days and to 30 per cent. in 8 days. Therefore, it seems, the effectiveness of the spraying depends on treating both interior and exterior walls.

The author concludes that DDT spraying is of definite value for controlling malaria, though its effects are short-lived in Malaya. Also, the value is likely to be slightly reduced in *letifer* areas by the habit of outdoor resting and occasional outdoor feeding by that mosquito. *J. R. Busvine*

REID, J. A., assisted by A. H. BIN OMAR. **Field Experiments with DDT in Oil as an Anopheline Larvicide. Part II. On Flowing Water.** *Med. J. Malaya.* 1950, Sept., v. 5, No. 1, 1–16, 3 figs.

In a series of carefully planned experiments on the flowing water of drains the authors have assessed the value of DDT in oil for killing the larvae of *Anopheles maculatus*. DDT in oil at about 4 oz. of DDT per acre will give 98 per cent. control only if it is evenly applied, in the full length of the drain. A practical method of applying such small quantities has not been evolved; for experimental purposes a dropping pipette was used. Interrupted application at spaced intervals in unweeded drains was unsatisfactory at a 50 per cent. control. The difficulty is the natural surface film or scum on the surface of the water, associated with vegetation. Oils of high spreading pressure (Malariol H.S.) improve the results but most favourable ones are only attained when weeding is satisfactory. Flit-gun trials were unsatisfactory.

Malariol applied by the standard knapsack sprayer at a dose of 23 gallons per acre had a more lasting effect than 5 per cent. DDT in Malariol H.S. at 4 oz. DDT per acre.

[The conclusion is that, for the efficient control of *A. maculatus* breeding, the laborious clean weeding of ditches must be maintained and oiling carried on regularly with the use of DDT in Malariol H.S., which is much cheaper but no more effective than the older plain Malariol.] *R. Ford Tredre*

BYRNE, A. A. **The Use of "Gammexane" P.520 as a Larvicide.** *Med. J. Malaya.* 1950, Sept., v. 5, No. 1, 17–20.

This paper describes briefly a trial of "Gammexane" dispersible powder, P. 520, as a larvicide in drains, seepages and ponds, the breeding places of both anopheline and culicine mosquitoes, including *Anopheles maculatus* in the drains. The usual Malariol was replaced in the same sprayers by a suspension of P. 520, 4 oz. per gallon of water. The application rate approximated that for Malariol, 15–20 gallons per acre, or between 3·9 and 5·2 oz. of *gamma* isomer per acre. The result on all types of water was freedom from breeding for 2 to 3 days.

A separate trial of 1 oz. P. 520 per gallon of water against the local vector of filariasis, *Mansonia*, was also successful; the larvae and pupae obtain oxygen

by inserting their respiratory siphons into the air cells in the submerged portions of water plants. The cost of P. 520 as a mosquito larvicide is about one-third or less that of oil. *R. Ford Tredre*

Downs, W. G., Celis S., H. & Gahan, J. B. **Control of *Anopheles pseudopunctipennis* in Mexico with DDT Residual Sprays applied in Buildings. Part III. Malariological Observations after Five Years of Annual Spraying.** *Amer. J. Hyg.* 1950, Nov., v. 52, No. 3, 348–52.

A thorough single annual interior spraying with DDT of all buildings in certain towns of the Mexican rice-growing areas [this *Bulletin*, 1949, v. 46, 614, 1119] has been continued over several years without any appreciable change in the reduction in numbers of *A. peusdopunctipennis* adults and larvae obtained during the first year of treatment ; adults resting in houses were reduced by 99 per cent. and larval density in adjacent rice-fields fell by 85 per cent. However, large numbers of adults are still found in unsprayed buildings (controls) of the region. No evidence of a resistant strain of *A. pseudopunctipennis* in treated villages can be found.

Reasonably accurate malariological data are available for five years, 1945–49. A marked reduction in both clinical and confirmed cases occurred ; the seasonal peak of incidence disappeared. In 1949 all the confirmed cases, 10 all together, were proved to be imported. Cases of *P. falciparum* infection, which formerly contributed half the total, have become rare. The few autochthonous cases of malaria have been due to *P. vivax* mainly, with an occasional *P. malariae* infection. Spleen rates of 15–20 per cent. indicate a persistence of malaria in the region, which is due to relapse of benign tertian infections and an influx of infected children from other untreated areas. Parasite rates in treated towns fell by nearly 90 per cent. *R. Ford Tredre*

Schiavi, A. & Proença, L. M. Novo metodo biologico de controle da ação residual do DDT. [**A New Biological Process of Residual Action of DDT.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 129–38. English summary.

The method employs mosquito larvae to detect small traces of DDT dusted off treated walls by cotton-wool plugs. The toxic limits for mosquito larvae are solutions containing DDT at 1 : 100 million to 1 : 130 million. Thus they are very sensitive to small traces of DDT, but it is admitted that residues from emulsions and dispersions are more ready to affect them than residues from solvents insoluble in water.

To make a test, a series of cotton-wool pieces are used, which can be carried in the mouth of a glass tube about 18 mm. in diameter. Each in turn is pressed lightly against the treated wall and the tube rotated slightly. It is then pushed into the tube and covered with a paper partition so that the next piece can be inserted. Since the area examined is only 2 square centimetres, a number of tests must be used to get an average for the wall. The cotton-wool plugs are taken back to the laboratory and put separately into tubes about 3×9 cm., each containing 10 ml. water. Then 6–8 culicine larvae, of 2nd or 3rd stage, are added and observed for up to 20 hours (at intervals). The progress of intoxication and numbers of deaths indicate effectiveness of the deposits at the points sampled.

Some tests were made in this way from a box treated with DDT at the rate of 0·0003 mgm. /sq. cm. The progress of deaths of the larvae corresponded fairly well with that of the deaths of the adult mosquitoes confined in the box.

J. R. Busvine

JASWANT SINGH, RAY, A. P. & NAIR, C. P. **Suppressive Action of Mepacrine, Aphacrine, Chloroquin, Camoquin and Proguanil against *P. knowlesi* in *S. rhesus* Monkeys.** *Indian J. Malariology.* 1950, Mar., v. 4, No. 1, 97–109. [19 refs.]

A series of experiments designed to test the efficacy of the above-named drugs as suppressants of blood-induced *P. knowlesi* malaria in *Macacus rhesus* monkeys was carried out at the Malaria Institute of India over a period of 3 years. The schedules followed were :—

(1) Daily drug administration for 7 days prior to inoculation.
(2) Daily drug administration for 7 days subsequent to inoculation.
(3) Daily drug administration for 7 days prior and for 7 days subsequent to inoculation.
(4) Daily drug administration for 7 days prior and for 7 days subsequent to inoculation, and thereafter for 21 days at bi-weekly intervals.
(5) Daily drug administration for one week prior and for 4 weeks subsequent to inoculation.
(6) Bi-weekly drug administration for 4 weeks prior and 10 weeks subsequent to inoculation.
(7) Weekly drug administration for 2 weeks prior and 4 weeks subsequent to inoculation.
(8) Weekly drug administration for 4 weeks prior and for 10 weeks subsequent to inoculation.

The drugs were administered in doses varying from 10 to 50 mgm. in most cases and up to 100 mgm. in respect of mepacrine and proguanil in the weekly and bi-weekly schedules. Altogether 138 monkeys were used in these experiments.

The results achieved with chloroquine and camoquin were markedly superior to those obtained with the other 3 drugs, chloroquine being apparently the more effective of the two. Under the first 5 schedules there was little difference in the suppressive effect of mepacrine and proguanil, but under the weekly and bi-weekly schedules mepacrine gave the better results. This was in marked contrast with results previously recorded with sporozoite-induced infections of *P. knowlesi*, where proguanil proved superior to mepacrine as a suppressant, a finding in accordance with the known action of proguanil on the pre-erythrocytic stages of *P. falciparum*. The number of tests made with aphacrine (2 methoxy-6 chloro-9-(4'-diethylamino-1'-methyl-butyl)-amino-acridine dihydrochloride) were too few for precise evaluation of its suppressant activity, but the drug was manifestly inferior to both chloroquine and camoquin in this respect.

[For chemotherapeutic studies with the same drugs, see this *Bulletin*, 1950, v. 47, 1181.] *G. Covell*

DUBIN, I. N., LAIRD, R. L. & DRINNON, V. P. **Further Observations on the Development of Sporozoites of *Plasmodium gallinaceum* into Cryptozoites in Tissue Culture.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 119–27, 7 figs. (4 coloured) on 2 pls.

Though the authors have previously [this *Bulletin*, 1950, v. 47, 327] succeeded in obtaining the development of sporozoites of *Plasmodium gallinaceum* in tissue cultures of normal chicken macrophages, they were unable to maintain the cultures more than 2–3 days. They have since analysed the cause of their failure, and found that it was due to contamination of the cultures by bacteria, owing to insufficient dosage of antibiotics added to the medium. It was shown that penicillin and streptomycin, which were used in their experiments, rapidly

deteriorated in the culture medium even in the absence of living cells and micro-organisms. Further tests carried out with these antibiotics indicated that at high concentrations they not only killed the bacteria, but also damaged the host cells. Moreover, when used together, penicillin and streptomycin had a synergic effect on these elements. Finally, the following method, which was free of all these defects, was devised : (*a*) the rinsing solution contained 100 units of penicillin and 100 microgramme-equivalents of dihydrostreptomycin base per ml., (*b*) on even days fresh nutrient fluid containing the same concentrations of antibiotics was substituted for the old medium, (*c*) on odd days half of the above amounts of antibiotics was added to the medium. With this technique it was possible to maintain bacteria-free cultures of macrophages and pre-erythrocytic stages of the parasites up to 7 days of incubation after the inoculation of sporozoites of *P. gallinaceum* from salivary glands of infected *Aëdes aegypti*.

In these cultures the development of successive generations of the parasites lost its synchronism. The parasites grown *in vitro* were capable of infecting chicks from 36 to 144 hours after initiation of the cultures. The authors also made two attempts to cultivate sporozoites of *P. vivax* in cultures of human bone marrow and liver respectively, but the results were negative in both cases.

C. A. Hoare

Laird, R. L., Dubin, I. N. & Drinnon, V. P. **The Infection of Chicks with Pre-Erythrocytic Stages of *Plasmodium gallinaceum* grown in Tissue Culture.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 128–31, 1 fig.

In this paper an account is given of the results of inoculation of chickens with pre-erythrocytic forms of *Plasmodium gallinaceum* which developed in tissue (chick macrophages) culture, as described above. Week-old chicks were inoculated intravenously with 1 cc. of suspension of cultures from 1 to 144 hours after initiation of the cultures with sporozoites from infected salivary glands of *Aëdes aegypti*. It was shown that the cultural forms were infective to chickens and produced in them erythrocytic parasites which underwent the normal life-cycle, as in infections transmitted from chick to chick by mosquitoes. Control experiments, in which sporozoites were kept in dilute chicken serum without macrophages, indicated that the sporozoites can remain viable up to 48 hours at 37°C. and *p*H 7·4. Therefore, infections of chicks with cultures up to two days old might have been produced by surviving sporozoites, whereas those produced by older cultures were undoubtedly due to pre-erythrocytic forms.

The erythrocytic parasites (including gametocytes) of the chicks developed normally in mosquitoes fed on them, and the sporozoites subsequently recovered from the insects were successfully cultivated in chick tissue and were also infective to new chicks. The infection produced in chicks by parasites from tissue cultures differed from that produced in them by sporozoites in its milder course : while in the latter case the birds died in 2–3 weeks after inoculation, in the former case they survived in spite of heavy parasitization. This might point to some alteration in the virulence of the parasites when grown *in vitro*.

C. A. Hoare

Manwell, R. D. & Brody, G. **Survival and Growth of Four Species of Avian *Plasmodia* on the Harvard Culture Medium.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 132–44, 3 text figs. & 8 figs. on pl. [24 refs.]

The authors record the results of comparative studies on the growth in the "Harvard medium" [this *Bulletin*, 1947, v. 44, 1043] of 4 species of avian

malaria parasites, *Plasmodium gallinaceum*, *P. lophurae*, *P. cathemerium* and *P. relictum*, the first two of which were maintained in chickens and the last two in ducklings. The appearance of the parasites in culture was judged by periodical examination of stained smears, and their viability by inoculation into fresh birds. The degree of success in cultivation was measured by the " Growth Index " representing " the ratio of parasite population at the end of a period of cultivation to that at the beginning ", which was based on enumeration of the parasites per 10,000 erythrocytes.

The Harvard medium proved to be not very suitable for cultivation of the four avian plasmodia. The best results were obtained with *P. relictum*, the average growth index of which after 24 hours of cultivation was 2·12, the parasites remaining viable for 65 hours. The results were more promising with cultures in which duck plasma was substituted by canary serum. In the case of *P. gallinaceum* growth was poor, the best index after 24 hours being 1·60, while in *P. cathemerium* and *P. lophurae* the growth index was only 1·02 and 0·63 respectively. However, even when little or no multiplication took place, the parasites in culture sometimes remained viable up to 63 hours.

C. A. Hoare

HUNNINEN, A. V., YOUNG, M. D. & BURGESS, R. W. **The Infection of Anopheline Mosquitoes by Native Avian Malaria.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 145–50.

It has been generally assumed that the host-restriction between malaria parasites and mosquitoes is very high, anopheline mosquitoes being the exclusive vectors of human malaria, and culicines of avian malaria. However, strains of avian *Plasmodium* kept in unnatural hosts have been transmitted experimentally by *Anopheles*, and there are a few records of the development of these parasites in anophelines fed on infected wild birds.

Working in South Carolina for several years, the authors have found that English sparrows (*Passer domesticus*) there were commonly infected with *Plasmodium relictum* [this *Bulletin*, 1950, v. 47, 819]. Starting from three naturally infected sparrows, the strain was passaged through other sparrows and canaries, and infection experiments were carried out with *Anopheles quadrimaculatus*, *A. crucians* and *Culex pipiens*, which were allowed to feed on infected birds. The mosquitoes were usually dissected 17 days after the infecting feed.

All the three species of mosquitoes proved to be in various degrees susceptible to infection with the sparrow *Plasmodium*. *A. quadrimaculatus* showed the highest (47·4) percentage of oöcysts on the stomach, but the percentage of sporozoite-infected salivary glands was 2·6, whereas *C. pipiens* had only 20·0 per cent. gut infections but the highest gland infection (29·4 per cent.). As regards *A. crucians*, only a few survived the experiments, and in none of these were any fully developed sporozoites found. The parasites from canaries did not develop so readily in mosquitoes as the parasites from sparrows. It was shown that mosquitoes did not transmit the infection from sparrow to canary, but could transmit it from canary to canary.

From these results it is seen that *P. relictum* readily develops in *A. quadrimaculatus*, and if these mosquitoes feed on sparrows under natural conditions, the finding of infected anophelines has an important bearing on the incidence of human malaria based on mosquito dissections. [The percentages given in the text are based on experiments where the three mosquito species were fed together (the first 6 feedings) and therefore differ slightly from those in the table, where all 9 feedings are shown.]

C. A. Hoare

FIELD, J. W. & EDESON, J. F. B. **A Malaria Parasite of the Malayan Squirrel.** *Bull. Inst. Med. Res. Federation of Malaya.* 1949, No. 2, 24 pp., 7 pls. [25 refs.]

The authors describe a malaria parasite found in 4 species of squirrels of the Malay Peninsula, *Callosciurus notatus*, *C. nigrovittatus*, *C. tenuis* and *C. caniceps*. In the life-cycle of this parasite there are erythrocytic and exo-erythrocytic phases closely resembling the stages of development of *Hepatocystes kochi* of African monkeys The stages in the red blood corpuscles vary considerably in appearance. They comprise small and large ring forms, irregular forms (including *tenue*-like) and band forms, as well as round gametocytes which fill the entire host-cell. Since schizogony was not observed in the peripheral blood, the authors conclude that erythrocytic forms all represent growth stages of the sexual form, though they state (footnote p. 4) that this is " A somewhat surprising conclusion since the younger parasites looked very much like the early asexual forms of mammalian species of *Plasmodium* and lacked the morphological characters which usually mark the young gametocyte ". [There is the same element of doubt in the case of *Hepatocystes kochi*, and it is conceivable that some of the young blood forms of both simian and squirrel parasites might actually be trophozoites derived from merozoites produced in the liver.]

As in the case of the primate malaria parasites, the exo-erythrocytic development of the squirrel parasites takes place in the liver parenchyma, in which merocysts visible to the naked eye and measuring up to 840 μ in diameter are formed. Like the merocysts of *H. kochi*, they consist of three zones : an outer wall (membrane) of compressed liver tissue, adjoining a middle zone of merozoites, and a structureless centre. From a study of sections and smears of the merocysts, the authors believe that they represent " megalo-schizonts " which give rise to merozoites " without the formation of cytomeres ". On the other hand, they describe and depict (Pl. III) " larger bodies resembling immature . . . schizonts " in which repeated nuclear division takes place, giving rise to minute merozoites. [It would thus seem that these " larger bodies " represent an intermediate stage in the schizogony, comparable—in significance at least—to cytomeres.]

The authors next consider the systematic position of the squirrel parasite which in view of the close resemblance of its life-cycle to that of the African simian parasite, is also referred to the genus *Hepatocystes*. Since they regard it as a subspecies of *Plasmodium vassali* (Laveran, 1905) from an Indo-China squirrel, the name of the parasite from the Malayan squirrels becomes *Hepatocystes vassali malayensis*, and that of the former—*H.v. vassali*. [When speaking about the simian parasite, the authors several times erroneously refer to it as " *Plasmodium* (*Hepatocystes*) *kochi* ". In zoological nomenclature this means that it belongs to the genus *Plasmodium* and subgenus *Hepatocystes*. Since in this instance it is intended to indicate the old genus as well as the new one, this should be done as follows : *Hepatocystes* (=*Plasmodium*) *kochi*.]

In conclusion, the authors discuss the schizogonic development of the malaria parasites of man, monkeys, squirrels and bats, and compare the characters of the genera *Plasmodium* and *Hepatocystes*. *C. A. Hoare*

TRYPANOSOMIASIS

BUREAU PERMANENT INTER-AFRICAIN DE LA TSÉ-TSÉ ET DE LA TRYPANOSOMIASE. Léopoldville (Congo Belge). [**Conference of the International Scientific Committee of Trypanosomiasis Research held at Antwerp, June 20th-23rd, 1950.**] *Bulletin Bibliographique.* 1950, Oct., No. 7, pp. 216–69 (mimeographed). [In French & English.]

The International Scientific Committee for Trypanosomiasis Research was constituted as the result of a recommendation made by the Trypanosomiasis Conference held at Brazzaville in February 1948 [see this *Bulletin*, 1950, v. 47, 899]. The second meeting of the Committee was held in Antwerp from June 20th to 23rd, 1950, under the chairmanship of RODHAIN, and the following were present as Members, Advisers or Observers: BRUTSAERT, BUXTON, BONNE, CECCALDI, EVANS, FERREIRA, FORD, GUYAUX, HENRARD, MORRIS, NEUJEAN, OSBORNE, ROUBAUD, SCAILLET, du TOIT and VAUCEL.

The Report reproduces a number of papers that were presented on all aspects of trypanosomiasis, and the following is a transcription (with minor changes in phraseology) of the main conclusions recorded :—

A. ENTOMOLOGY

1. Tsetse eradication in certain areas has not resulted *ipso facto* in eradication of animal trypanosomiasis, and certain factors other than glossinae play their part in transmission of the disease. These other factors, and particularly the rôle of mechanical transmission by biting flies of cattle (*Stomoxys* and Tabanidae) require further investigation.

2. Following the success achieved by aerial spraying of insecticides in tsetse eradication and the subsequent disappearance of animal trypanosomiasis, it should be of great interest to test this method against *G. palpalis* in the control of human trypanosomiasis.

3. The importance is stressed of rational utilization of tsetse-reclaimed land, both to ensure the maintenance of soil fertility and to avoid return of the fly.

4. Further research on the biology of tsetse flies is necessary. There are indications that certain species may play a hitherto unsuspected part in transmission of the human disease, for example, *G. caliginea* in the coastal area around Douala (French Cameroons).

B. PROTOZOOLOGY

FAIRBAIRN and CULWICK have carried out extensive studies on the relationship between the polymorphic trypanosomes, and further research along these lines would be useful.

C. CHEMOPROPHYLAXIS AND CHEMOTHERAPY

a. Animal Trypanosomiasis

1. *Dimidium bromide.*—Though excellent therapeutic results have been achieved, a good number of toxic reactions were recorded which should be thoroughly investigated.

2. *Antrycide.*—This has confirmed the hopes at the time of its discovery and has proved extremely valuable; it is a most effective therapeutic drug, with no toxic reactions except for some reported in the Belgian Congo. It is too early yet to decide on the degree of its prophylactic value. A drawback to its extensive use is its high cost.

b. Human Trypanosomiasis

1. The use of melarsen and melarsen oxide seems to have been abandoned.

2. *Mel B* :—i. This is an excellent trypanocidal drug with a powerful influence on the cerebrospinal fluid. However, the hopes of a possible use at both stages of the disease have not been realised.

ii. It has been rather toxic and has resulted in too high a percentage of deaths.

iii. In the present stage of our knowledge concerning *Mel B*, the diamidines are to be preferred for the lymphatico-blood stage of infection.

iv. In the nervous stage *Mel B* has not given better results than tryparsamide, and its use is recommended only when a patient is no longer capable of further benefit from tryparsamide.

Mel B is a most interesting acquisition, but a fair number of field trials are yet required before it can be used in routine practice.

3. *Pentamidine.*—This is the most valuable prophylactic drug now available (dosage—an intramuscular injection of 5 mgm./kgm. of the isethionate, or 4 mgm./kgm. of the hydrochloride, repeated every 6 months). It would be useful to determine the duration of the protection conferred by a single injection of pentamidine.

4. The antimonial MSb seems to have interesting prophylactic value, but only restricted trials have been carried out.

D. Diagnosis and Prognosis of Human Trypanosomiasis

1. Haemoculture as a means of diagnosing trypanosomiasis has been developed at Léopoldville and will undoubtedly be of practical interest.

2. Cephalic fluid collected by the air insufflation technique gives a more accurate indication of a return to normal than the total cerebrospinal fluid, and enables a decision to be reached as to whether a case of nervous infection has been cured.

E. Maps of Tsetse Distribution

Regional maps are to be sent to Potts, to enable him to present a general map of the distribution of glossinae throughout Africa at the next session of the Committee, about June 1951. *E. M. Lourie*

Moçambique. Missão de combate as tripanossomíases. Relatório Anual de 1948. [**Annual Report for 1948 of the Trypanosomiasis Commission.**] 144 pp., 6 maps (5 folding). 1950. Lourenço Marques : Imprensa Nacional de Moçambique.

The constitution of the Mission and its programme of work were fully described in the Report for 1947 [see this *Bulletin*, 1949, v. 46, 984] ; the present Report shows the work done and results obtained during 1948 and gives proposals for the future. The European staff was increased to 56, the African staff was 106. Various buildings—residences, laboratories, dispensaries, stores, garages, etc.—were erected, several motor vehicles procured, and other equipment such as drugs, insecticides, rifles and ammunition, etc., obtained.

Visits were made to Zululand, Swaziland, Southern and Northern Rhodesia, Tanganyika Territory, Kenya and Uganda, and communications on boundary and other matters were exchanged with the neighbouring territories. Details are given of an extensive tour of the whole colony made by the Head of the Mission, Dr. M. A. de Andrade Silva, during June, July and August, over 10,000 km. being covered.

Tsetse fly surveys.—As agreed at the international tsetse fly conference at Brazzaville [see this *Bulletin*, 1948, v. 45, 770 ; 1950, v. 47, 899], a tsetse fly map of the colony was made at the end of the year. Spread of the fly had occurred in the Tete district which must be regarded as permanently infested ; an investigation in collaboration with officers of S. Rhodesia resulted in finding a *G. morsitans* area north of the R. Luenha near Changara. The Zambesi province had not been surveyed for many years and big changes in the distribution of the three species present—*G. morsitans*, *G. pallidipes* and *G. brevipalpis*—had taken place. In Chimoio 4 foci of *G. austeni* were discovered.

Sleeping sickness.—The endemic area remained unchanged ; 282,602 persons were examined and 249 new cases, all in Africans, were found, 123 in the Tete area and 126 in Niassa province ; 38 were in the early stage, 211 in the late stage. Old cases, diagnosed and treated from 1940 to 1947 were looked up and it was found that 361 out of 1,297 were still alive. In the laboratory service 44,065 blood examinations were made. Prophylaxis included supervision of labourers on the railway, roads and plantations, clearing of vegetation and other anti-tsetse measures. Chemoprophylaxis is thought to be scarcely applicable to Rhodesian sleeping sickness, but pentamidine isethionate was tried, a dose of 5 mgm. /kgm. being given and repeated after 6 months ; if the results are good the drug may be used for individual prophylaxis.

Animal trypanosomiasis.—An experiment with a preparation of DDT and Gammexane, applied to cattle in bathing tanks, was made at Salamanga in the Maputo area ; the only food of the tsetse fly here (*G. brevipalpis*) is the blood of hippopotami and cattle, and if the former were expelled or killed the fly would be dependent on the cattle ; about 1,500 head of cattle will be used in the experiment. A special report will be made. Dimidium bromide was given *gratis* to all native cattle in some areas. Near the R. Save a campaign against wild game was begun and was combined with other anti-tsetse measures. An investigation into the index of infection of the four species of tsetse flies present in a single area (Mossurize) was begun ; the 9,006 flies dissected comprised 2,964 *G. austeni*, 2,403 *G. brevipalpis*, 2,165 *G. pallidipes*, and 1,474 *G. morsitans*. When it is complete a special report will be made. The results of dissection of 33,000 *G. morsitans* in various parts of the colony are tabulated.

Control of animal trypanosomiasis.—The question is discussed and a detailed statement by the chief of the veterinary section is reproduced in the Report. In the Zambesi province 4,412 wild animals have been killed since August 1946 and 2,048 were killed in 1948.

A list of publications by members of the staff is given. There are three appendices ; the first is an instruction on the diagnosis and treatment of sleeping sickness by Dr. Andrade Silva ; the second instructs how dimidium bromide should be administered, and the third is a critical review of the effects of this drug ; both are by Dr. Pires the chief of the veterinary section. These appendices contain much detailed information and are of great interest. See also this *Bulletin*, 1948, v. 45, 1068 ; 1949, v. 46, 530. *J. F. Corson*

FERREIRA, F. S. da C. Relatório do Chefe da Missão referente ao ano de 1949. [**Report of the Sleeping Sickness Commission in Portuguese Guinea for 1949.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 509–48, 1 map & 2 graphs.

During 1949 the work of the Commission has made satisfactory progress ; details of its staff, equipment, costs and activities are given in the text and shown clearly in 15 tables [for the 1947 Report see this *Bulletin*, 1949, v. 46, 1013]. The population of the colony is estimated at about 400,000 ; besides the chief medical officer there are 4 others, various assistants and servants

making a total personnel of 56. The 4 medical officers examined 60,120 people and found 1,341 cases of sleeping sickness. Medicinal treatment included a trial of Mel B and penicillin, and in two areas, Quecete and Caio, pentamidine was used as a prophylactic [see below]. During the year 32,093 tsetse flies (*G. palpalis* 26,068, *G. longipalpis* 5,682, and *G. submorsitans* 343) were captured, 3,877 were dissected and 133 were found infected, the salivary glands being involved in 16. Trypanosomes were found in 51 of 559 animals (cattle, pigs, goats, sheep and 17 gazelles) ; some were treated with Antrycide. Among other activities mentioned are the publication of scientific papers and the maintenance of relations with the other African colonies concerned with trypanosomiasis. *J. F. Corson*

Ferreira, F. S. da C., de Almeida, C. L. & Pires, F. M. Primeiros resultados do tratamento da tripanosomíase humana pelo Mel B. [**Treatment of Human Trypanosomiasis with Mel B.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 35–52. English summary.

The arsenical compound Mel B was used to treat 107 hitherto untreated cases of Gambian sleeping sickness in Portuguese Guinea apparently during 1949 ; 5 were in the first stage of the disease, 23 in the second and 79 in the third, and in the last group the cerebrospinal fluid (c.s.f.) contained over 0·05 per cent. of protein in 60 per cent. and trypanosomes in 34 per cent. The blood, lymphatic glands and c.s.f. were examined before treatment in all cases ; trypanosomes were found in the c.s.f. in 16 per cent. and in the blood or lymphatic glands in 92 per cent. Mel B was given as a single series of 4 daily injections [intravenous no doubt] of 3·6 mgm./kgm. to 38 of the patients and this course was repeated a week later in the case of the other 69. Trypanosomes disappeared from the blood and glands within 24 hours in 80 per cent., within 48 hours in 18 per cent., and within 72 hours in the other 2 per cent. of the patients. The c.s.f. was examined at 1–2 months, 3–5 months, and 6 months after the end of treatment ; of 20 second-stage patients 16 were improved at 6 months (14 with normal c.s.f.) and 4 were worse, while of 67 in the third stage, examined periodically up to a year later, 59 were improved (13 with normal c.s.f.), 4 had died, 2 were worse and 2 unchanged. The results of the single series of injections were about equal to those of the double series.

Some toxic effects occurred in 25 per cent. ; these included slight albuminuria and casts (14 per cent.), nausea, colic and diarrhoea (7 per cent.), Herxheimer reaction (3 per cent.) and dermatitis (1 per cent.).

The results agree with those of other workers [see also this *Bulletin*, 1949, v. 46, 711, 919 ; 1950, v. 47, 449, 824]. *J. F. Corson*

Ferreira, F. S. da C., de Almeida, C. L. & Pinto, A. R. Resultados da químio-profilaxia com a pentamidina : modificações do índice de contágio da população e do indice de infestação das glossinas. [**Chemoprophylaxis of Trypanosomiasis with Pentamidine.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 19–33, 2 folding maps. English summary.

Pentamidine has been shown during recent years to be an effective prophylactic against Gambian sleeping sickness [this *Bulletin*, 1946, v. 43, 536 ; 1947, v. 44, 974, 979, 1048 ; 1948, v. 45, 411, 502, 878 ; 1949, v. 46, 123, 1015 ; 1950, v. 47, 451, 453, 824, 825]. In 1949 the authors tried it in two small selected areas in Portuguese Guinea, Quecete in the island of Bissau and Caio in the mainland. In Quecete, 936 of the population of 945 were inspected, the suspicious cases, including 8 infected, were excluded from the experiment and the remaining 900 persons were each given an intramuscular injection of

pentamidine isethionate, 4 mgm./kgm. In Caio 1,474 persons were inspected, 16 were found infected, 9 others suspicious, and the remaining 1,449 were divided into two groups ; 712 received an injection of pentamidine and 737 formed an untreated control group. About 8 months later 746 at Quecete were re-examined and no infections were found, and at Caio 452 of those injected were re-examined and no infections found, while 10 of the 528 controls re-examined were infected.

Trypanosomes (*T. brucei*, *T. congolense*, *T. vivax*, and *T. theileri*) were found in cattle and pigs at Quecete ; those infected were given an injection of Antrycide, 5 mgm./kgm. Some thousands of tsetse flies (*Glossina palpalis*, 87 per cent., *G. longipalpis*, 13 per cent.) were dissected before and after the experiment in both areas ; no significant change in the index of infection was found.

Severe reaction to the drug occurred in two only of 1,612 persons injected ; they had sweating, vomiting and cardiovascular collapse which responded to adrenaline.

The authors conclude that a dose of pentamidine isethionate, 4 mgm./kgm., protects against infection with *T. gambiense* for at least 8 months.

J. F. Corson

LAUNOY, L. Prophylaxie chimique de l'infection expérimentale à *T. gambiense* du rat blanc, par le méthane sulfonate du diamidino-diphénoxypentane ; essais relatifs à l'établissement du rapport de la dose préventive à la dose toxique. [**Chemoprophylaxis of** *T. gambiense* **Infection in the Rat by Lomidine : Ratio of Prophylactic Dose to Toxic Dose.**] *Bull. Soc. Path Exot.* 1950, v. 43, Nos. 9/10, 574–81.

Uninfected rats were given a single subcutaneous injection of lomidine (the dimethanesulphonate of pentamidine base). Each rat was then inoculated intraperitoneally 2, 3 or 4 times, at intervals ranging from 1 to 222 days after the treatment, with 5 to 20 million parasites of the Yaoundé strain of *T. gambiense* [see this *Bulletin*, 1950, v. 47, 20 and 21].

The author concludes that the protection afforded by 5 mgm./kgm. is usually less than 25 days, by 10 mgm./kgm. it is 25 to 60 days, by 20 and 25 mgm./kgm. more than two months, by 50 mgm./kgm. 110 to 150 days, and by 100 mgm./kgm. about 6 months in 50 per cent. of cases. Adopting 300 mgm./kgm. as the LD50, the ratio of the 50 per cent. prophylactic dose to the LD50 is therefore 1/3 for 5 to 6 months' protection and 1/6 for about 4 to 5 months' protection.

[The practice of reinoculating the same rat several times hardly seems well adapted to the purpose of defining the degree of prophylaxis attributable to the drug alone, uncomplicated by any immunity that may have been conferred by preceding test-inocula. This criticism has already been raised by FULTON [this *Bulletin*, 1944, v. 41, 929] in connexion with similar work by VAN HOOF, HENRARD and PEEL [*ibid.*, 928], to which the author makes due reference. He does indeed acknowledge some possible influence of the test-inoculum on immunity processes in the experiments he has described, for he writes that the lysis of the parasites of successive inoculations may work in two opposing directions, (*a*) in the favourable direction of giving rise to agglutinins, and (*b*) in the unfavourable direction of providing toxic by-products.] *E. M. Lourie*

PETROW, V. & WRAGG, W. R. **Contributions to the Chemistry of Phenanthridine. Part II. The Preparation of 2 : 7-Diamino-9-3′-pyridylphenanthridine 1′ : 10-Dimethiodide.** *J. Chem. Soc.* 1950, Dec., 3516–18.

WALLS, L. P. **Potential Trypanocides of the *N*-Heterocyclic Series. Part V. Structural Conditions for Activity against *Trypanosoma cruzi* in the Phenanthridine Series.** *J. Chem. Soc.* 1950, Dec., 3511–16.

FIENNES, R. N. T.-W. **The Cattle Trypanosomiases : Cryptic Trypanosomiasis.** *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 222–37. [14 refs.]

The author distinguishes two stages in the infection of cattle with *Trypanosoma congolense* : a primary stage comprising the incubation period, pre-critical period, critical period and post-critical period ; and a secondary stage whose main features are strengthening of serum antibody and disappearance of trypanosomes from the peripheral blood, yet with disease present in the body which may cause severe symptoms and often causes death. The primary stage may be inhibited by drugs and so it is very important to recognize the secondary stage ; this is characterized by the infrequent appearance of small numbers of trypanosomes in the peripheral blood and by anaemia ; there is no known curative treatment for this stage but spontaneous recovery is frequent. An animal in the secondary stage cannot be infected with another strain of *T. congolense*. The blood shows a decrease in the amount of haemoglobin and in the number of erythrocytes, there is neutropenia, the eosinophiles disappear, and there is a periodical monocytosis associated with a reduction of the number of trypanosomes in the blood ; the reduction in haemoglobin is the most constant feature.

The author describes experimental work done during the last four years with cattle infected with *T. congolense* or *T. vivax* or both. The results of mouse protection tests by the method of Schilling and Neumann [FIENNES, this *Bulletin*, 1950, v. 47, 827], of examinations of the state of the blood, and of the effect of giving dimidium, phenidium, antrycide dichloride and antrycide dimethyl sulphate, are shown in tables. These experiments included prophylactic drug treatment followed by exposure of the cattle to natural infection in an area (Kiboko, 110 miles from Nairobi) heavily infested with *Glossina pallidipes*, *G. longipennis* and *G. brevipalpis*.

The author concludes that in the cryptic infection of the secondary stage there must be some focus of infection with trypanosomes which are often active, not dormant ; he suggests that during the secondary stage serum antibody can inhibit invasion of the blood by the trypanosomes in the absence of adverse conditions, and the apparent protection by drugs given in prophylactic and subcurative doses, depends not on the direct action of the drugs but on the creation of a premunition focus. The acute symptoms of the primary disease are caused by the parasites in the blood while the chronic symptoms of the secondary disease " seem to arise from a morbid tissue focus." Drugs are probably unable to produce a sterile immunity, as antibodies disappear from the blood when the disease is cured. Regularly repeated injections of dimidium maintain the infected animals in a good state of health and condition with a cryptic infection, but when the drug is stopped most of them die of the infection. Antrycide was not given regularly but only when the trypanosomes were found in the blood and severe cryptic infection became established in the cattle.

The blood changes occurring in four cattle naturally infected with *T. vivax* were studied and are shown in a table ; the four animals died after 16, 14, 15, and 23 days respectively ; blood changes were present before trypanosomes were found in blood slides.

The author considers that the presence of antibody, as shown in the mouse-protection tests, is a sure indication of the presence of a cryptic infection. The anaemia in both primary and secondary stages has the same characters.

J. F. Corson

LOCK, J. A. **The Chemotherapeutic Action of Phenanthridine Compounds. Part IV. Activity** *in vitro*. *Brit. J. Pharmacol. & Chemotherapy.* 1950, Sept., v. 5, No. 3, 398–408, 5 figs. & 1 pl.

The trypanocidal activity of phenanthridinium compounds *in vitro* was studied by a method adapted from that of YORKE, ADAMS and MURGATROYD [this *Bulletin*, 1930, v. 27, 237]. A strain of *T. rhodesiense* was used because of the difficulty of suitably maintaining *T. congolense in vitro*.

Highest trypanocidal activity *in vitro* was exhibited by "150C47", *i.e.* 2 : 7-diamino-9-*p*-aminophenyl-10-methylphenanthridinium chloride [see BROWNLEE *et al.*, this *Bulletin*, 1951, v. 47, 1070], and by dimidium bromide, each of which killed 90 per cent. of trypanosomes in 24 hours at a concentration of 1/1,000,000, and in 48 hours at 1/2,000,000. The orders of activity of 4 compounds tested against *T. rhodesiense* were the same *in vitro* as *in vivo*, but the least active compound had as much as one-quarter of the *in vitro* activity of the most active, though it was practically inactive *in vivo* while the other compound was highly active *in vivo*. The range of potencies among these compounds was therefore much wider *in vivo* than *in vitro*.

When trypanosomes were exposed *in vitro* for half or one hour to concentrations of the drugs found to be effective during 24 hours' exposure, and were then washed free of the drug and resuspended in drug-free medium, they showed mortality curves similar to those obtained when the drug was continuously present. These compounds therefore have a rapid and persistent effect, and this is further illustrated by the fact that the infectivity of *T. congolense* was much impaired if the trypanosomes were taken from an infected animal as soon as half an hour after it had been treated by dimidium bromide, even though the trypanosomes remained active and in undiminished numbers in the treated mouse for more than 24 hours. These results indicated the possibility of rapid absorption and fixation of the drugs by the trypanosomes, but drug estimations revealed little or no absorption by living trypanosomes during 30 minutes at 37°C. except in a concentration as high as 1/10,000. No evidence could be obtained of activation of the drug by incubating with serum at 37°C. for periods up to 1 week, and no *in vitro* antitrypanosome activity, other than that attributable to circulating drug, could be detected in the serum taken from treated rabbits.

In vitro experiments with the blood forms of *T. cruzi* suggested that though the urethane-substituted phenanthridinium compounds exercise some activity against these forms, they are either inactive against the intracellular forms or do not penetrate readily enough to reach concentrations lethal to the enclosed parasites. Experiments were therefore performed with tissue cultures containing large numbers of infected cells, and it was thus shown that this type of compound can injure the intracellular forms of the parasite in concentrations which do not affect the host cells.

E. M. Lourie

ROUBAUD, E. & BOURDIÉ, M. Essais sur l'action curative et préventive de l'antrycide sur les trypanosomiases animales. [**Therapeutic and Prophylactic Tests of Antrycide in Laboratory Trypanosome Infections.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 552–6.

Antrycide methylsulphate was curative in doses of 2·5 mgm./kgm. (route of injection not stated) in rats and mice infected with *T. brucei*, *T. congolense* or

T. evansi. Some relapses were observed in mice infected with *T. congolense* even after a dose of 5·0 mgm./kgm., but only if trypanosomes had been particularly numerous at the time of treatment. It is worth noting that relapses of *T. congolense* infection in mice occurred up to as late as 44 days after treatment. A dose of 5 mgm./kgm. cured a goat of a mixed infection with *T. vivax* and *T. congolense* induced by *Glossina*.

Prophylactic tests with the chloride were carried out at a uniform dose of 5 mgm./kgm. against *T. evansi* and *T. equinum* in rats and mice. Complete protection may be observed for about 20 days after treatment. Infections which do occur in prophylactically treated animals run a very chronic course. Subinoculations from such chronic infections result in normally acute infections. The authors conclude that, in practice, antrycide chloride should be used for prophylaxis only with great caution, since it may result in chronic or cryptic infections, the affected animals thus becoming reservoirs of infection.

E. M. Lourie

SPINKS, A. **Absorption and Persistence of Antrycide.** *Brit. J. Pharmacol. & Chemotherapy.* 1950, Sept., v. 5, No. 3, 445–54, 5 figs.

The author describes results obtained by the method which he has developed for the estimation of antrycide in body fluids [SPINKS, *Nature*, 1949, v. 163, 954, this *Bulletin*, 1949, v. 46, 813 ; *Biochem. J.*, 1950, v. 47, 299].

The solubility of the methylsulphate is about 300 mgm./ml. and that of the chloride about 1 mgm./ml. Consequently the methylsulphate is rapidly and probably almost completely absorbed, the maximal plasma concentration increasing regularly with the size of dose. When, however, a suspension of the much less soluble chloride is administered, only the part that is actually in solution is rapidly absorbed, while the undissolved portion remains as a drug depot. Increases in dose-size of the chloride therefore do not significantly raise the maximal plasma concentration.

The methylsulphate rapidly diminishes in the plasma after injection, so that a concentration of 4,000 μgm./litre falls to less than 10 μgm./litre within 24 hours. After injection of either salt high concentrations are reached in the liver and kidney, only small amounts being found in other tissues. The liver and kidney continue to harbour the drug for some weeks (longer after chloride than after methylsulphate administration), and it can also be detected for corresponding periods in the urine. Persistence after a subcutaneous injection is, however, probably attributable more to long-continued slow absorption of the sparingly soluble chloride from the subcutaneous reservoir rather than to absorption from the depots in the liver and kidney. *E. M. Lourie*

GOODWIN, L. G. & WALLS, L. P. **Antrycide and Dimidium.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Sept., v. 44, No. 2, 233–6.

The authors express their disappointment at the absence of "any real comparison between antrycide and dimidium" in papers published on the subject of antrycide [DAVEY, this *Bulletin*, 1950, v. 47, 968 ; CURD and DAVEY, *ibid.*, 1949, v. 46, 338 ; 1950, v. 47, 827]. Some comparison, indeed, there was, but it was between the effects of one drug given subcutaneously and those of the other given intraperitoneally. The present authors have found that if the two compounds are given by the same route, whether subcutaneously or intraperitoneally, against either of two strains of *T. congolense* (neither of which was the one used by DAVEY) in mice, dimidium appears to be a little more active than antrycide.

In toxicity tests in mice the methylsulphate of antrycide was found to be about equal in toxicity to dimidium bromide when given intravenously and about three times as toxic when given subcutaneously. The local necrotic actions of the two drugs in mice and guineapigs are about equal. Local effects were also studied in a few English cattle. Each animal received 0·5 mgm./kgm. antrycide methylsulphate subcutaneously on one side of the neck, and the same dose of dimidium bromide on the other. The local reactions produced were about equal, except that the induration caused by antrycide appeared in a day or two and that produced by dimidium only after 2 or 3 weeks. No sloughing occurred with either drug in the quantity used ("half of the therapeutic dose of dimidium and from half to one-tenth of the dose recommended for antrycide"), and the reaction caused by dimidium bromide was unaffected by exposure to sunlight or by skin pigmentation. *E. M. Lourie*

MARTIGNOLLES, J. & ADJOVI, P. Traitement au bromure de dimidium de bovins atteints de trypanosomiase dans le Fouta-Djalon. [**Dimidium Bromide in the Treatment of Trypanosomiasis in Cattle in Fouta-Djalon.**] *Bull. Serv. de l'Élevage de l'Afrique Occidentale Française.* 1950, Apr.–Sept., v. 3, Nos. 2/3, 25–7.

MACAULAY, J. W. & SHAW, G. D. **A Report upon Control of Trypanosomiasis in Livestock in Northern Rhodesia.** *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 133/0.* Léopoldville (Congo Belge). [No date]. 7 mimeographed pp.

JERVIS, O. & MONTALVAN C., J. A. Un brote familiar de Enfermedad de Chagas (tripanosomiasis americana) observado en Guayaquil. [**A Family Outbreak of Chagas's Disease in Guayaquil.**] *Rev. Ecuatoriana de Hig. y Med.Trop.* 1949, Jan.–Dec., v. 6, Nos. 1/4, 103–46, 4 charts & 16 figs. English summary.

This article starts with the customary account of Chagas's discovery of the trypanosome and of the different forms the disease may assume, together with a description of the various symptoms. The authors then proceed to describe five cases, all in one family: a woman of 60 years, three others [? daughters] aged 27, 24 and 23 years, and a lad [? son] of 18 years. All had fever and were diagnosed at first as suffering from typhoid fever (three of them gave an agglutination from 1 : 25 to 1 : 100) and were treated with chloromycetin. This brought down the temperature, but when the drug was stopped the fever returned. Later, three were diagnosed by the finding of *T. cruzi* in the blood, one by inoculation of blood into white mice, and one by complement fixation. Four were acute cases and two of these patients died—the mother and the daughter aged 24; the others recovered. The lad's was apparently a chronic case; he had headache, diminished reflexes and was mentally dull. He was the one to give the complement fixation; the trypanosome was not found in his blood. The younger woman who died was autopsied and photographs show very clearly an interstitial myocarditis and aggregations of leishmania forms of the trypanosome in the myocardium. As no cases have previously been reported from Ecuador, it is thought that this family may constitute a new focus of this disease. *H. Harold Scott*

DE FREITAS, J. L. P. Dados atuais sobre a distribuição de triatomídeos e moléstia de Chagas na delegacia de saúde de Sorocaba. [**On the Present Distribution of Triatomidae and Chagas's Disease in the Delegacia de Saúde of Sorocaba.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1948, v. 13, Nos. 35, 36, 37 & 38, 93–6, 1 map. [10 refs.] English summary.

Sorocaba is a district towards the southern part of the State of São Paulo. Complement fixation tests with *T. cruzi* antigen carried out on 105 school-children between 7 and 13 years of age gave 29 (7·6 per cent.) " strongly or moderately positive " and 16 (15·2 per cent.) weakly positive ; 8 out of 111 gave a positive result to xenodiagnostic methods. Fifty-eight others, nearly all adults, in hospital, similarly tested by complement fixation gave 19 positive and 2 others weakly positive, and 3 of 15 of these tested by xenodiagnosis were positive. *Triatoma infestans*, 540 in number, were examined by CARDOSA & NAVAJAS in 1941 [see this *Bulletin*, 1942, v. 39, 248] and COUTINHO the same year found 64·2 per cent. positive of those captured by him [? number]. The authors captured in the same locality 4,490 Triatomidae, but seem to have examined only 20 of them and found " 60% infected with *T. cruzi* " [? 14].

The results of examinations in 6 municipalities are given. In Santana do Parnaiba 861 *T. infestans* were captured in 14 houses and 251 were examined but none was found infected in nature, though easily infectible in the laboratory; this may, therefore, be regarded as a potential focus of Chagas's disease. In Itapeva of 7 specimens one was infected ; in Araçoiaba da Serra one was caught but it was not infected. In three other municipalities one only has been found infected and that was in 1941. *Panstrongylus megistus* has been recorded in the region but the authors found only *T. infestans*. A line map indicates the distribution of cases of the disease and of Triatomidae in Sorocaba.

H. Harold Scott

JOSÉ OSIMANI, J., VERÍSSIMO, S. & BAYCÉ CARBONELL, P. La profilaxis de la enfermedad de Chagas en el Uruguay por medio del gamexano. Experiencias realizadas—plan de lucha contra el *Triatoma infestans*. [**Prophylaxis of Chagas's Disease in Uruguay by means of Gammexane.**] *Bol. Oficina Sanitaria Panamericana.* 1950, Nov., v. 29, No. 11, 1125–34, 1 map.

The vector of *T. cruzi* in Uruguay is *Triatoma infestans*. A trial district, Porvenir, 14 miles east of the town Paysandú, was chosen. It has a population of 433 in 128 dwellings ; most are agricultural workers and peons, and most of the homes are infested with the bugs, and TÁLICE in 1938 showed that at that time 50 per cent. of the bugs were infected with *T. cruzi*.

In February 1949 spraying with Gammexane was started after the furniture had been removed from the dwellings. The preparation used was Gammexane P-530, a 7·5 per cent. suspension in water ; the powder contains 6·5 per cent. of the gamma isomer, so the suspension contains approximately 500 mgm. per 100 cc., and this amount is sprayed over each square metre of wall surface. Nobody complained of the odour of the preparation.

The next day 30 of the bugs, some dead, some still living, were seen. A month later, the inhabitants of eight dwellings were questioned ; they all said that after a few days they had seen no more bugs, living or dead, and none of them had been bitten. In three dwellings part of the wall was broken down but only one empty egg was found. At intervals up to 9 months other inspections were made and the results were most satisfactory.

In Uruguay 5 reduviid bugs are met with : *Triatoma infestans, T. sordida, Eutriatoma rubrovaria, Neotriatoma circummaculata* and *Panstrongylus geniculatus*. The third of these is rural in habitat and not often found in the houses ;

T. infestans is the domiciliary reduviid. A line map shows its widespread prevalence over some two-thirds of Uruguay and about 39 per cent. of them are infected with *T. cruzi*. The first human case was recorded in 1937 and up to the present 370 have been diagnosed, 365 in an early stage (4 have died) and five with chronic cardiac changes (2 have died).

For eradication of the insect it is proposed to work by brigades, each with a lorry and equipment and three teams (*equipos*) ; there is a chief of brigade and each team comprises a sanitarian and an assistant, 7 persons in all. An assistant gets the house ready for spraying, then the sanitarian sprays ; another assistant prepares the next house and while the spraying of this is being carried out the first restores the furniture of the former to its place. It is calculated that each brigade can deal with 90 dwellings in an 8-hour day and Paysandú has 10,000 dwellings of which, say, 5,000 are infested. Thus, the whole could be dealt with in about 55 days. *H. Harold Scott*

AGOSÍN, M. & BADÍNEZ, O. Algunas caracteristicas de la infestación experimental con *Trypanosoma cruzi* en el conejo. [**Some Aspects of Experimental Infection with *Trypanosoma cruzi* in Rabbits.**] *Biológica*. Santiago. 1948, July–Dec. & 1949, July–Dec., Nos. 8, 9, 10 & 11, 11–31, 18 figs. on 9 pls. [45 refs.] English summary.

GHOSH, S. M. & BISWAS, T. C. **Occurrence of a Trypanosome in *Triatoma rubrofasciatus* in Calcutta.** [Correspondence.] *Nature*. 1951, Jan. 6, 35, 1 fig.

The authors found large numbers of trypanosomes in various stages of development, in the guts of 36 of 45 specimens of the bug *Triatoma rubrofasciatus* collected in Calcutta. No parasites were found in the haemocoele fluid, salivary glands and the oesophagus but developmental forms of trypanosomes were found in the mid and lower sections of the intestine : the faecal matter from the lower intestine contained only crithidia and trypanosomes.

A camera lucida drawing illustrates the various forms of the parasite. The trypanosome was long and slender, with an average total length of 34 μ (the flagellum was 11 μ long). It was often C-shaped and the posterior end tapered to a point. In young forms the undulating membrane was narrow. The nucleus was oval and situated posteriorly. The parabasal body was somewhat elongated and the flagellum rather small. Detailed measurements are given in a table. Further work is in progress. *H. J. O'D. Burke-Gaffney*

FLOCH, H. & ABONNENC, E. Sur un trypanosomidé de singe infectant naturellement la cavité générale de *Triatoma rubrofasciata* et celle de *Rhodnius prolixus*. [**Simian Trypanosomes infecting the Body-Cavity of Triatomid Bugs.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 201*. 1949, Dec., 8 pp., 6 figs.

An account is given of two trypanosomes of a South American monkey, *Cebus* sp., which normally develop in the gut of Triatomid bugs. However, when the infected faeces of these bugs are introduced *per rectum* into *Rhodnius prolixus* and *Triatoma rubrofasciata*, these acquire an infection of the body-cavity, with crithidial and trypanosome-like flagellates in the blood of the insect. When the infected haemo-lymph of the bugs is inoculated into guineapigs, the latter develop a cryptic infection which can only be revealed by xenodiagnosis. In the bugs used for this purpose, flagellates of different types develop in the gut and in the body-cavity. The authors have not been able to determine the mutual relations between the simian trypanosomes, and the flagellates developing in the gut and in the coelom of the bugs. *C. A. Hoare*

Borzone, R. A., Lapieza Cabral, P., Alvarez de Toledo, J. M. & Aizemberg, M. Una nueva tripanosomiasis americana en la Argentina. Hallazgo de *Trypanosoma rangeli* (Tejera, 1920) en hombre y perro. [**New Form of Trypanosomiasis in Argentina : *T. rangeli* in Man and in Dog.**] *Semana Méd.* 1950, June 8, v. 57, No. 23, 993–8, 2 figs. [10 refs.]

The authors report the first Argentine case of infection with a trypanosome, which they believe to be *Trypanosoma rangeli*, observed in a child and in a pup, as well as in *Triatoma infestans*. In the vertebrates the trypanosomes were seen in the peripheral blood, from which they could be readily cultivated in Bonacci's medium consisting of blood-agar and glucose. *C. A. Hoare*

LEISHMANIASIS

Antonio Cabrera, M. & Romeo de León, J. Historia del primer caso clinico de leishmaniosis visceral (kala azar) descubierto en Guatemala. [**Account of the First Clinical Case of Kala Azar in Guatemala.**] *Publicaciones del Instituto de Investigaciones Cientificas.* Guatemala. 1949, No. 2, 36 pp., 14 figs. [29 refs.] English summary.

This is a very detailed record of a case of infantile kala azar in Guatemala and believed to be the first there. It was in a female child of 23 months, with anaemia (red cells 2,460,000 per cmm., haemoglobin 45 per cent.) and a large spleen extending into the left iliac fossa. The symptoms were typical, but the diagnosis was for a time in doubt because the disease was not suspected and not known to exist in Guatemala. The formol-gel test was positive, *Leishmania* were seen in material from spleen puncture and growth was obtained in NNN medium. Illustrations of the local terrain, of the patient, of spleen smears, of the formol gel test, of leptomonad forms in culture and of another child with an ulcer of the face which, however, though resembling a cutaneous leishmanial infection, was not in fact leishmanial. *Phlebotomus* was present in the district.

H. Harold Scott

Banerjee, J. C. **Agranulocytosis in Kala-Azar. (With a Case Note.)** *Calcutta Med. J.* 1950, June, v. 47, No. 6, 178–81, 1 chart.

Agranulocytosis is a rare complication of kala azar in India, but in China it is comparatively common : it was noted in 7·6 per cent. of 554 cases by Huang [this *Bulletin*, 1940, v. 37, 773]. The author reports a case, not of agranulocytosis but of a severe degree of granulopenia. The diagnosis of kala azar was made by sternal puncture. The first blood count showed a leucopenia (1,562 per cmm.) with 49 per cent. polymorphonuclears. Intramuscular Neostibene (Brahmachari) was given. After two doses the patient developed a sore throat and the blood count then showed 731 leucocytes per cmm. with only 4 per cent. granulocytes. The antimony treatment was continued and nuclein, " pentose nucleotide ", and blood transfusions were given. Meanwhile, a throat swab showed Klebs-Löffler bacilli and anti-diphtheritic serum was also given. A full course of Neostibene [variously reported as 2 gm. and 2·2 gm.] was completed and a clinical cure ensued ; the blood count is reported as gradually increasing, " as can be seen from the attached chart ". [The chart actually shows the leucocyte count as rising to only about 2,500 per cmm. with the polymorphonuclears at under 40 per cent. ; the lymphocytes were also under 40 per cent., so that there are at least 20 per cent. of cells unaccounted for and some of these may have been other granulocytes. Even making these allowances, a granulocyte count of about 1,000 per cmm. is a poor sort of recovery.] *L. E. Napier*

DAS, A. & SEN GUPTA, P. C. **Relapse of Kala-Azar after Splenectomy.** *Lancet*. 1950, Dec. 2, 681–3. [17 refs.]

Several reports have been published recently suggesting that splenectomy may be a curative procedure in drug-resistant kala azar, but failures have been reported. The authors report another such failure, a case of kala azar in which relapse occurred after splenectomy had been performed a year previously in another hospital.

After a typhoid-like onset of fever, the patient was originally diagnosed and treated as kala azar in 1940. He relapsed after three months and was again given another full course of antimony. [It is stated that he was given sodium antimony gluconate, presumably Solustibosan, since at this date it was the only preparation of sodium antimony gluconate made, although it was not at that time described by the manufacturers as sodium antimony gluconate.]

He relapsed again in 1943 and received several courses of a variety of antimonials. In 1947, his symptoms recurred and continued despite another course of sodium antimony gluconate ; a diagnosis of splenic anaemia was made ; and splenectomy was performed. In October 1948, he was admitted to hospital and a diagnosis of kala azar confirmed by sternal puncture [apparently for the first time]. He was treated first with urea stibamine but not cured ; then a course of pentamidine was given but that was not completed on account of exacerbation of symptoms, and the patient gradually went downhill and died.

In their discussion the authors express much the same views on splenectomy in kala azar as did the reviewer [this *Bulletin*, 1950, v. 47, 341], to whose paper, incidentally, they do not refer, namely, that it may help in the cure in certain instances, but that no case has been made for its general adoption even in drug-resistant kala azar. They add that turpentine-mixture injections and X-ray radiation to the spleen should be given a trial in these drug-resistant cases.

L. E. Napier

CHAKRAVARTI, R. N. & SEN GUPTA, P. C. **Urinary Excretion of Antimony after Administration of Methyl Glucamine Antimoniate. Preliminary Observations.** *Indian Med. Gaz.* 1950, Sept., v. 85, No. 9, 388–91, 1 chart.

The authors have studied the urinary excretion of antimony in three cases of kala azar after the intramuscular injection of " methylglucamine antimoniate " [see this *Bulletin*, 1947, v. 44, 55, 56 and 807 ; 1949, v. 46, 924 and 1019 ; 1950, v. 47, 342].

The method used for antimony estimation was adapted from that of MACALLUM (*J. Soc. Chem. Indust.*, 1923, v. 42, 468 T), and did not enable a distinction to be made between pentavalent and trivalent forms of the element. After injection of a dose of therapeutic size, about 25 per cent. of the antimony was excreted in two hours, about 75 per cent. in 12 hours, over 80 per cent. in 24 hours, and about 90 per cent. in 48 hours. Thereafter no further antimony could be detected. DURAND *et al.* [this *Bulletin*, 1947, v. 44, 56], working with the same compound, found that antimony excretion in the urine ceases in normal subjects after 24 hours, but continues for 36 hours in cases of kala azar ; and the present authors' findings suggest that renal hypofunction in kala azar might be associated with delayed excretion.

The authors feel that in view of the rapid excretion of antimony after administration of the compound under investigation, there is little chance of cumulative toxic action if it be administered every other day.

E. M. Lourie

ANSARI, N., MOFIDI, C. & CHODJA-ZADE. Action *in vitro* et *in vivo* de l'antimoniate de N. méthyl-glucamine sur la *Leishmania tropica*. [**Activity of "N-Methylglucamine Antimoniate" (2168 R.P.) against *L. tropica in vitro* and *in vivo*.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 546–9.

Laboratory studies are reported on the antimonial designated as 2168 R.P. [see this *Bulletin*, 1947, v. 44, 55, 56 and 807 ; 1949, v. 46, 924 and 1019 ; 1950, v. 47, 342].

The minimum leishmanicidal concentration against *L. tropica in vitro* was found to be contained in 0·2 cc. of a 30 per cent. solution brought up to 1 cc. in the water of condensation removed from cultures in NNN medium.

For the *in vivo* studies mice were used, infection being produced by a strain of *L. tropica* which has been maintained in the authors' laboratory since 1942. Infections were confirmed by observing the parasites in testicular puncture fluid. It was concluded that the minimum amount that should be injected into a mouse weighing 18 to 20 gm. in order for parasites to disappear was 1·2 to 2 gm., given at the rate of 0·1 gm. per day. *E. M. Lourie*

REHM SCHMIDT, F. Leishmaniosis cutanea : posibilidades de nuevos metodos de tratamiento. [**Cutaneous Leishmaniasis ; New Methods of Treatment.**] *Sesiones Dermatologicas en Homenaje al Profesor Luis E. Pierini. Buenos Aires, 11 al 13 de noviembre de 1949.* pp. 465–71, 11 figs. 1950. Buenos Aires : Lopez y Etchegoyen S.R.L., Junin 863.

Cutaneous and mucocutaneous leishmaniasis may assume different forms : ulcers like tropical ulcer, sporotrichial or blastomycotic ; verrucose resembling nodular leprosy ; subcutaneous nodules and nasal polypi, or like coccidioidomycosis. For growth the organisms require plenty of oxygen and the author proposes retarding their growth or even getting rid of them by measures which reduce the oxygen supply to the tissues, as the use of vitamins and enzymes and by ascorbic acid and Rongalita C [see this *Bulletin*, 1948, v. 45, 1013]. He backs up his theory by stating that pinta, leprosy and leishmaniasis tend to spare the regions where the oxygen supply is low. *H. Harold Scott*

SALADINO, E. Tentativi di cura aureomicinica del Bottone d'Oriente. [**Treatment of Oriental Sore with Aureomycin.**] *Acta Med. Italica.* 1950, Oct., v. 5, No. 10, 352, 1 fig.

The English summary appended to the paper is as follows :—

"The author describes a case of cutaneous Leishmaniasis, successfully treated with local injections of aureomycin."

FEVERS OF THE TYPHUS GROUP

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. No. 23. **Joint OIHP/WHO Study-Group on African Rickettsioses. Report on the First Session. Brazzaville, 8–14 February 1950.** 23 pp. Geneva. 1950, Dec. [1s. 3d. ; $0.15.]

This is the Report referred to in this *Bulletin*, 1951, v. 48, 138. It consists for the most part of agreed statements of the considered views held by the members of the Joint Study-Group on the matters discussed. The members

of the group are experts with personal knowledge of the rickettsial diseases in every important country in Africa, so that the information contained in the report can be relied on with an exceptional degree of confidence.

The rickettsial fevers are discussed under the following headings: (1) Geographical distribution, (2) Classification and nomenclature, (3) Characteristics, (4) Differential diagnosis, (5) Clinical syndromes provisionally ascribed to the rickettsioses, (6) Research to be undertaken, (7) Prophylaxis, (8) Treatment.

Murine (flea-borne) and tick-borne typhus occur in all the large countries of Africa; classical, louse-borne typhus has never been proved to occur in French Tropical Africa, but is known in all the other countries, though in the tropical belt it is usually confined to areas at high altitudes.

The section dealing with differential diagnosis is of special interest. All the rickettsial fevers are said to "have the same endothelial lesions". The significance of the Weil-Felix reaction in tick-borne typhus is stated as follows; a positive reaction with *Proteus OX2* alone is diagnostic; a higher titre with *Pr. OX2* than with *Pr. OX19* indicates the probability of the disease; "with *Pr. OXK*, the reaction is more frequent, and gives a higher titre than with the preceding antigens". [No mention is made of the high-titre reactions with *Pr. OX19* which are so often observed in Rocky Mountain spotted fever.] The name "Congolese red fever" is regarded as having no justification. The connexion between boutonneuse fever and the other tick-borne rickettsial fevers is very close, but more research is needed before they can be regarded as identical. Spraying dogs and other animals with a 5·0 per cent. solution of DDT or "Gammexane" is recommended as a method of tick disinfestation. Aureomycin and chloromycetin should be made available to physicians at a moderate price in areas where rickettsial fevers are prevalent. A long list is given of the points that still need to be investigated.

The report is a model of concise and accurate expression, yet there is one flagrant lapse where reference is made to "*R. conori*, the vector of boutonneuse fever". Apart from this the word vector is employed in an unusually wide sense in the sentence "The animal vectors are the rat and the flea.".

John W. D. Megaw

See also p. 417, WOLFF, **A New Staining Method for Rickettsiae.**

WEYER, F. Die Entwicklung von Rickettsien in den Larven vom Mehlkäfer (*Tenebrio molitor* L.). [**Development of Rickettsiae in the Larva of the Meal Worm,** *Tenebrio molitor.*] Reprinted from *Schweiz. Ztschr. f. Allgemeine Path. u. Bakt.* 1950, v. 13, No. 4, 478–86, 7 figs.

The English summary appended to the paper is as follows:—

"The meal-worm, larva of Tenebrio molitor, is susceptible to the infection with R. mooseri, R. prowazeki and R. burneti, when inoculated into the celomic cavity. No change of virulence for mice and lice is observed after the passage through meal-worms. Multiplication of the rickettsiae in the meal-worm takes place especially within non-differentiated cells, within young fat cells and large numbers are seen in phagocytes. The abundant growth of R. burneti killed the worms about a week after inoculation. No growth of extracellular rickettsiae was observed. Meal-worms are not susceptible to the virus of mouse pneumonitis (*Gönnert*)."

HORRENBERGER, R. & ROUBERT, L. Modifications électrophorétiques du sérum sanguin observées chez le lapin au cours de la pneumonie rickettsienne provoquée. [**Electrophoretic Changes in the Serum of Rabbits during Induced Rickettsial Pneumonia.**] *Arch. Inst. Pasteur d'Algérie.* 1950, Sept., v. 28, No. 3, 350–63, 10 figs. [18 refs.]

Electrophoretic analysis was employed in the determination of the changes occurring in the sera of rabbits in response to the experimental induction of pneumonia by *Rickettsia prowazeki*. The results of the study are shown in a series of graphs and in two tables.

At the height of the illness there was a diminution in the albumin fraction and in the *gamma* globulin ; *alpha* globulin made its appearance, and *beta* globulin was increased. In early convalescence these changes tended to become stable or even to diminish, but *gamma* globulin which is associated with antibody formation, tended to increase.

Three months after the illness albumin became normal or even in excess of normal ; the *alpha* and *beta* globulins returned to normal, but there was still a high proportion of *gamma* globulin, which is possibly associated with the acquisition of immunity. *John W. D. Megaw*

FRANK, H. R. Der gegenwärtige Stand der Chemotherapie der Rickettsiosen. [**The Present Position of Chemotherapy of Rickettsial Diseases.**] *Zent. f. Bakt.* I. Abt. Ref. 1950, Apr. 30, v. 148, Nos. 1/2, 23–32. [77 refs.]

D'IGNAZIO, C. & BENETAZZO, B. Aggiornamento e critica della terapia del dermotifo. [**A Critical Review of the Treatment of Typhus Fever.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Oct., v. 31, No. 10, 733–58. [66 refs.] English summary.

This comprehensive review of the therapy of typhus fever is based on a study of the literature and on the authors' own extensive experience.

The conclusion reached is that the best results are obtained by giving chloromycetin by the mouth in doses of 3·0 gm. during the first two hours and followed by doses of 0·5 gm. every 4 hours till the end of the period for which the fever would have been expected to last if specific treatment had not been given. The presumable natural duration of the illness is estimated as being 14 or 15 days.

The data available are not considered to be enough to justify definite conclusions regarding the relative value of aureomycin.

John W. D. Megaw

D'IGNAZIO, C. & TERMINE, L. La cloromicetina nella terapia del dermotifo in Etiopia. (Nota clinica). [**Chloromycetin in the Treatment of Typhus in Ethiopia.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Sept., v. 31, No. 9, 638–43. [10 refs.]

The English summary appended to the paper is as follows :—

" The writers report on good results obtained in the treatment of 10 cases of typhus in Ethiopia with Chloromycetin (9 cases) and Aureomycin (1 case). They thus confirm reports published by Payne and coll., Smadel and coll., and Benhamou and coll.

" In order to ensure a successful treatment, the writers recommend on the basis of their experiences, to continue the treatment with Chloromycetin beyond the fall of temperature, until complete recovery."

HORRENBERGER, R. Sur la durée de conservation de l'activité du vaccin rickettsien formolé préparé suivant la technique de Durand et Giroud. [**The Keeping Properties of Formol-Treated Rickettsia Vaccines prepared by the Durand-Giroud Method.**] *Arch. Inst. Pasteur. d'Algérie.* 1950, Sept., v. 28, No. 3, 364–75. [14 refs.]

The vaccines were tested by giving a course of three injections at weekly intervals to guineapigs which were challenged three weeks after the last dose by large doses of virulent rickettsiae.

It was found that the vaccines showed some early diminution in their effectiveness and then retained a considerable degree of protective value for a long time, even up to more than four years, if kept in the ice-chest at 6°C. One sample, however, completely lost its potency after being kept for 68 months.

The author stipulates that the vaccines must originally have a high antigenic content.

[The number of guineapigs employed in testing each vaccine was usually four, and in some cases there were wide differences in the responses shown by individual animals of each small group.] *John W. D. Megaw*

KHAN, N. **Scrub Typhus. (As seen in Jamshedpur.)** *Indian J. Med. Sci.* 1950, Nov., v. 4, No. 11, 487–95. [14 refs.]

The author describes 400 cases of scrub typhus seen during the period October, 1947, to November, 1949, at Jamshedpur, the great steel-works' settlement in Bihar. In each of the years, 1948 and 1949, the incidence rose sharply about two months after the onset of the rainy season and most of the cases occurred during the following five months.

An eschar was detected in 30 per cent. of the cases. The fever was remittent in 90 per cent. of the cases during the first week. A blotchy erythematous rash was seen in 60 per cent. of the patients.

The *Proteus OXK* reaction was positive at titres of 1–250 or over in 86 per cent. of patients tested during the third week ; no mention is made of tests with *Pr. OX19* or *Pr. OX2*.

In 16 consecutive cases attempts were made to isolate *Rickettsia orientalis* by intraperitoneal inoculation of white mice ; positive results were obtained with all the eight patients tested during the first 10 days of the fever, and with two other patients tested on the 13th and 16th days respectively ; the remaining six patients, who gave negative results, were examined between the 11th and 26th days. Every patient from whom a strain was isolated gave a negative *Pr. OXK* reaction on the day the blood was taken, and four of the six patients from whom rickettsiae could not be isolated had *Pr. OXK* titres of 1–625.

Aureomycin was given to " several cases " ; the initial dose was 1·0 gm. ; the total dosage was 8·0 gm. given, after the first dose, at the rate of 0·5 gm. every four hours. The temperature became normal within 24 to 36 hours, and there was complete freedom from gastrointestinal side effects. In some cases only 4·0 gm. were given, but although toxaemic symptoms disappeared there was a recurrence of low fever which started 24 hours after the last dose and lasted about a week.

There were 11 deaths among the 400 cases ; all the fatalities were among patients who were grossly toxic on admission.

[A survey of the epidemiological conditions associated with the occurrence of the disease in Jamshedpur would be a useful complement to the present study.] *John W. D. Megaw*

SMADEL, J. E., LEY, H. L., Jr., DIERCKS, F. H. & TRAUB, R. **Immunity in Scrub Typhus : Resistance to Induced Reinfection.** *Arch. Pathology.* 1950, Dec., v. 50, No. 6, 847–61, 5 figs. [Refs. in footnotes.]

In the first experiment 14 volunteers who gave no history of previous attacks of scrub typhus were inoculated intradermally with a Gilliam strain of *R. orientalis* ; in each case there was an attack of the disease with a local lesion, which started on the eighth to tenth day.

Treatment with aureomycin or chloromycetin (chloramphenicol) or terramycin, started two days after the onset, caused the usual prompt suppression of the attacks, but in 9 of the cases there was a relapse 3 to 13 days after the commencement of the treatment, which apparently consisted of a single dose of 3·0 gm. in some cases and of 6·0 gm. given as a course lasting 3 days in others. All the relapses yielded at once to a further course of treatment similar to the original one, and thereafter the convalescence was uninterrupted.

None of 8 other volunteers who had had previous attacks 1 to 2 months earlier with homologous strains of infection reacted to the inoculation.

Among 16 volunteers who had been attacked 1 to 2 years previously by strains of infection known or presumed to be heterologous 11 reacted in the same way as the volunteers who had no history of previous attacks except that the incubation period ranged from 9 to 17 days and no relapse occurred in any of them after course of suppressive treatment. Rickettsiae were recovered from 10 of the 11 patients.

One volunteer who had been attacked 3½ years previously by a known strain was inoculated with the same strain and gave no reaction except a slight local erythema.

It is suggested that little or no immunity persists for one or two years against a heterologous strain, but that there may be lasting immunity against a homologous strain.

There is, unfortunately, evidence of the occurrence of pronounced antigenic differences between strains, even in the same locality ; for example, among 8 strains recovered in a field of a few hundred acres near Kuala Lumpur 4 subgroups were found to occur.

From the table it appears that in experimental attacks among previously infected persons the *Proteus OXK* reaction was negative or remained at a constant low titre in nearly all the cases, and that even in attacks among persons not previously infected significant rising-titre reactions occurred in only half of the cases. *John W. D. Megaw*

MILLER, J. K. **Rocky Mountain Spotted Fever on Long Island.** *Ann. Intern. Med.* 1950, Dec., v. 33, No. 6, 1398–406. [19 refs.]

Evidence is given to show that Rocky Mountain spotted fever has been occurring in Long Island, New York State, since 1912. Up to 1937 the average annual number of cases diagnosed has been less than two. Since 1938 the average has been about 14.

Among 159 recorded cases the fatality rate has been 14·5 per cent.

All but 11 of the cases occurred in the four months May to August in which the presumed vector tick *Dermacentor variabilis* is most abundant and active. The dog is believed to play an important part in transmission by bringing ticks into contact with human beings who may sometimes become infected by picking the ticks from their dogs.

In 1949 the sides of paths and roads in the tick-infested area were sprayed in June and August with a 5 per cent. solution of DDT applied at the rate of 5 lb. to the acre and infestation was completely controlled.

John W. D. Megaw

SANER, R. G. & FEHLER, B. M. **A Case of Q Fever contracted on the Witwatersrand.** *South African Med. J.* 1950, Dec., v. 24, No. 48, 1000–1002, 1 fig.

The authors describe a proved case of Q fever on the Witwatersrand. The patient had been in close contact with living cattle and sheep. The complement-fixation titre was 1–50 on the 12th day and 1–200 on the 18th day.

An unusual feature was the occurrence of wild delirium, but in all other respects the attack was typical of a severe form of the disease.

John W. D. Megaw

STOKES, Joan. **"Q" Fever in South Australia. I. Isolation of Causative Organism from Four Cases and its Identification as** *Rickettsia burneti*. *Med. J. Australia.* 1950, Nov. 18, v. 2, No. 21, 745–50. [27 refs.]

Q fever had not been described from any part of Australia except Queensland till 1947 when J. M. DWYER diagnosed cases occurring in abattoir workers in South Australia. Rickettsiae recovered from two patients in Adelaide have now been thoroughly studied by the author. These strains and two others isolated from two of the three persons infected during the laboratory investigation, are shown to be closely related to the Henzerling (Italian) strain of *Rickettsia burneti*.

In a note it is stated that Leishman's stain is now used in Burnet's laboratory and that the author has found it invaluable "since it is far more reliable than either Castañeda's stains or Macchiavello's method" for staining yolk-sac smears. It is not suitable for animal tissues. *John W. D. Megaw*

SILVA GOYTIA, R. Fiebre Q en Mexico. Nota preliminar. [**Preliminary Note on Q Fever in Mexico.**] *Medicina.* Mexico. 1950, Nov. 10, v. 30, No. 615, 453–5.

The English summary appended to the paper is as follows :—

"A serological survey in dairy cows from State of Mexico showed the presence of complement-fixing antibodies against Q fever antigen in 13 out of 889 sera studied. The possibility of the existence of the Q fever virus is being the subject of investigation."

SILVA GOYTIA, R. Fiebre Q en Mexico. II. Estudios serológicos. [**Serological Studies on Q Fever in Mexico.**] *Medicina.* Mexico. 1950, Dec. 10, v. 30, No. 617, 493–7. [16 refs.]

The English summary appended to the paper is as follows :—

"Complement-fixation tests employing an egg-yolk sac antigen of *Coxiella burneti* (American Nine Mile strain) were performed on sera from 644 residents at "La Laguna", States of Coahuila and Durango. Evidences of previous infection with *Coxiella burneti* were obtained. Antibody titers of 1/8 to 1/32 were found in 1·8%."

DENGUE AND ALLIED FEVERS

Bucco, G. Osservazioni sulla dengue in Africa Orientale. [**Observations on Dengue in East Africa.**] *Acta Med. Italica.* 1950, July, v. 5, No. 7, 235–42. [33 refs.] English summary.

The author describes dengue as observed by him in 42 cases at Dire Dawa which lies 1,200 metres above the sea level and a few hours by motor transport from Addis Ababa where the disease is said to be endemic.

Certain features of the disease are emphasized which deserve to be more generally recognized than is the case even today. Among these are the frequent occurrence of mild attacks without rash or second rise of temperature. Such attacks are regarded as occurring in persons partly immunized by heterologous strains of the virus. [Homologous strains would equally cause partial immunity.]

A diagnosis of dengue in doubtful cases is deprecated when the conditions are such that transmission by *Aëdes* mosquitoes can be excluded.

John W. D. Megaw

Woodhill, A. R. **Observations on the Comparative Survival of various Stages of** *Aëdes* (*Stegomyia*) *scutellaris* **Walker and** *Aëdes* (*Stegomyia*) *aegypti* **Linnaeus at varying Temperatures and Humidities.** *Proc. Linnean Soc. of New South Wales.* 1949, v. 73, Pts. 5/6, 413–18. [Summary taken from *Rev. Applied Entom.* Ser. B. 1950, Oct., v. 38, Pt. 10, 175–6.]

Aëdes scutellaris, Wlk., is the common vector of dengue in the territory of Papua—New Guinea, but the vector in Australia is *A. aegypti*, L., which has been recorded as far south as southern New South Wales. As, however, a form or subspecies [*katherinensis*, Woodhill] of *A. scutellaris* has recently been recorded in the Northern Territory of Australia, the question arises whether *A. scutellaris*, if introduced into Queensland or New South Wales, could establish itself and become an important vector of dengue there. Experiments were therefore carried out to determine the relative viability of *A. aegypti* and *A. scutellaris* under winter and summer conditions in Sydney and under the colder conditions that prevail in exposed situations in inland parts of New South Wales during the winter.

The following is substantially the author's summary of the results. Even under optimum conditions of temperature and humidity (80°F. and 70–80 per cent. relative humidity), only 5–20 per cent. of eggs of *A. scutellaris* that had been on a wet surface for two days remained viable after about 80 days in the dry state, whereas 58–80 per cent. of the eggs of *A. aegypti* survived under similar conditions. Under natural conditions of temperature and humidity throughout the winter, spring and early summer in the Sydney district, all eggs of *A. scutellaris* were killed when allowed to remain dry for about 80 days, while 46–83 per cent. of eggs of *A. aegypti* hatched. Eggs of *A. scutellaris* exposed for three days to 34°F. were not significantly affected, but exposure to 40°F. for 14 days killed a significantly larger proportion of the eggs of *A. scutellaris* than of those of *A. aegypti*.

Larvae of *A. scutellaris* were killed by exposure to 40°F. for 48 hours, whereas those of *A. aegypti* were not adversely affected. All pupae and adults of *A. scutellaris* were killed by exposure to 40°F. for 72 hours, whereas 15–22 per cent. of the pupae and a large proportion of the adults of *A. aegypti* survived. Females of both species were more resistant to cold than males.

The results indicated that *A. scutellaris* requires tropical conditions and would not establish itself permanently in subtropical or temperate zones where *A. aegypti* is commonly found. The present known distribution of the two

species conforms with this view. In attempts to cross males of each species with females of the other, copulation apparently took place and some hundreds of eggs were laid, but none of these was fertile.

A statistical note by D. B. Duncan confirming the significance of the data is appended.

BUCCO, G. Osservazioni sulla febbre de pappataci. [**Observations on Sandfly Fever.**] *Acta Med. Italica.* 1950, Oct., v. 5, No. 10, 349–51. [13 refs.] English summary.

The author has already published the result of his clinical observations on cases of both dengue and sandfly fever which he has seen in East Africa [see above]. His present paper is based on cases of these diseases which he has met with in Naples in the period 1943–1945. He concludes that the clinical picture of sandfly fever which he has seen in Naples does not differ from what he has met with in East Africa. Differential diagnosis between dengue and sandfly fever may be easy during an epidemic, but it may prove difficult clinically to make such a differential diagnosis in sporadic cases : mild symptoms, absence of rash and of a second febrile wave may characterize a case of dengue as well as cases of sandfly fever. FLEMING, BIGNALL and BLADES [this *Bulletin*, 1947, v. 44, 711] have found a positive Kernig sign and muscular rigidity, and altogether a less mild clinical picture, in cases of sandfly fever which occurred among Anglo-American toops in Italy. Bucco has found the Kernig sign to be invariably absent and the disease to be generally milder in the local inhabitants. He refers to the varying susceptibility which different individuals show to the sandfly bite and he believes that those who have been living in a territory where sandflies are not prevalent do not at first feel or otherwise notice the bites because their skin has not yet become sensitized to the insect and does not yet react thereto. In the absence of other evidence of malaria, Bucco has not found an enlarged spleen among his cases of sandfly fever.

J. Cauchi

CHOLERA

RANTA, L. E. & MCLEOD, Mary. *Vibrio cholerae* **in Fluid Media.** *Canadian J. Res.* Sect. E. Med. Sci. 1950, Dec., v. 28, No. 6, 257–61. [10 refs.]

An investigation was carried out for the purpose of devising a simple synthetic medium which could be used for the preparation of cholera vaccine in fluid culture, and which would be free from risk of producing the local or general reactions which may result from the presence of digested proteins.

A basic medium was prepared which would satisfy the mineral demands. This contained 5·0 gm. sodium chloride, 0·75 gm. dipotassium hydrogen phosphate and 0·1 gm. magnesium sulphate in one litre of distilled water. To it were added appropriate concentrations of 20 different amino acids, singly or in combination, and the growth obtained in the media after inoculation was determined in comparison with silica standards at a range from 100 to 1,000 p.p.m. Preliminary tests were carried out with 5 ml. quantities, first with single amino acids, then with pairs and finally with the addition of other single amino acids, or pairs, to the pairs which had given the most promising growth.

In the tests single amino acids were found to support only sparse growth of *V. cholerae*, the best result being obtained with asparagine which produced a turbidity equal to 200 p.p.m., as compared with 250 p.p.m. obtained in a

casein digest basic medium. Glycine and isoleucine gave a level of 100 p.p.m., but only traces of growth or no growth at all were obtained with other single amino acids used. Of pairs tested tyrosine plus glycine gave growth equalling 250 p.p.m., tyrosine plus isoleucine 200 p.p.m., and tyrosine plus alanine 175 p.p.m. Asparagine in combination with tyrosine, histidine or glycine produced growth equal to 125 or 150 p.p.m. Tryptophan and proline completely inhibited the growth obtained with the combination of tyrosine and glycine, and several other amino acids reduced it. The addition of alanine, isoleucine or lycine to the tyrosine and glycine mixture raised the yield to 300 p.p.m. and arginine raised it to 375 p.p.m. The best combination was found to be tyrosine, glycine and asparagine ; this gave a density of growth equal to 450 p.p.m. or roughly double that obtained in the casein digest basic medium. Yield was not further increased by the addition of any other amino acid and, as a rule, any other addition lowered the yield.

On the basis of the preliminary findings a medium was prepared which contained 0·067 per cent. tyrosine 0·051 per cent. glycine, 0·042 per cent. asparagine and 1·0 per cent. glucose. The carbon dioxide/sodium bicarbonate buffering system recommended by Jennings and Liston (*Arch. Biochemistry*, 1944, v. 4, 311) was introduced and bulk quantities were submitted to continuous aeration, after inoculation, during a period of incubation of 48 hours.

The yields obtained were considerably over 650 p.p.m., and in most cases over 1,000 p.p.m. In occasional instances they reached as high as 1,600 p.p.m. of the silica standard, which is about three times greater than the density of the cholera vaccine now ordinarily used. Vaccines prepared in the synthetic medium are being compared antigenically with the standard type.

J. Taylor

Seneca, H. & Henderson, E. **Extrarenal Azotemia in Cholera.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 855–61. [12 refs.]

The term external azotaemia is applied to the condition occurring in cholera patients in which there is high blood urea nitrogen along with continuing renal function. Uraemia does not develop if ischaemia is not prolonged, and there is rapid and complete recovery without damage, apparently, to the renal cells. The findings in six cases are described. In commenting on the condition it is remarked that there is no definite evidence whether the endotoxin liberated from the vibrios on their death has any direct effect on the kidney cells or whether the impairment of renal function is due entirely to dehydration and ischaemia. As all the patients recovered there was no means of ascertaining whether or not a low degree of renal damage had occurred. Any damage was probably mild or transient. It is considered likely that tissue breakdown concomitant with severe dehydration may be responsible for some proportion of the nitrogenous constitutents appearing in the blood. *J. Taylor*

Gurkirpal Singh & Ahuja, M. L. **A Note on the Antigenic Relationship to *V. cholerae* of the so-called 'A' Type of Vibrio (Burrows) and 'B' Type of Vibrio (Gallut).** *Indian J. Med. Res.* 1950, July, v. 38, No. 3, 317–37.

An investigation was carried out in relation to certain findings recently reported by Burrows *et al.* and by Gallut [see this *Bulletin*, 1947, v. 44, 422 ; 1949, v. 46, 631] on the antigenic structure of strains of *V. cholerae*.

The findings differed on certain points from those obtained in India and elsewhere in the course of every extensive investigations on organisms of the vibrio group during the last fifteen years and, as a firm basis for the serological

diagnosis of *V. cholerae* is essential both for epidemiological purposes and for the selection of strains for the manufacture of vaccine, it was considered necessary to study vibrio strains of different origin in the light of the later reports.

While it has been accepted that vibrios which can be classified on all grounds as *V. cholerae,* possess a common O antigen (A), and the Ogawa and Inaba forms the factors B and C respectively in addition which are characteristic of the types, BURROWS *et al.* have described a serological form containing the A antigen only. They have also reported finding the B and C antigens in non-cholera vibrios and consider that the diagnosis of *V. cholerae* should be made by the use of monospecific A serum. These workers have also reported finding 10 additional O factors, D–M, in strains of *V. cholerae* which they have examined, and their findings have been supported by GALLUT. One strain examined by Gallut was reputed to be devoid of the group antigen A and to show the B antigen only.

Serological and other examinations were carried out on strains received from Dr. Burrows and Dr. Gallut, including those stated to be A and B forms and some with subsidiary antigens.

The type strains classified as pure A and B could not be accepted as *V. cholerae* because they were not agglutinable with either non-differential serum or monospecific B or C sera, and also because they either differed in their fermentation reactions from *V. cholerae* or were haemolytic. The so-called A type vibrios did not show any serological relationship among themselves, and cross-absorption tests failed to show any relationship to the group or type antigens ordinarily accepted as characteristic of *V. cholerae.* Gallut's " pure B " strain also did not agglutinate with either non-differential O cholera serum or monospecific B and C sera, and its biochemical reactions differed from those of *V. cholerae.* A very large number of vibrio strains isolated from cholera and non-cholera sources were tested for agglutination by the use of high-titre sera prepared against two of Burrows's and two of Gallut's so-called A strains. None was agglutinated although all cholera strains, whether freshly isolated or maintained as stock laboratory cultures, were agglutinated by the non-differential O serum used in the Institure for routine identification of *V. cholerae* or by monospecific serum of either the Ogawa or Inaba type (B or C). This had been the experience in the course of examination of several thousand strains. An " A " type serum received from Dr. Gallut was found to contain A and C agglutinins and would be classified as a non-differential Inaba serum. His " B type " serum agglutinated an Ogawa culture to the same titre as a rough cholera culture.

It is suggested that the finding by Gallut that the B and C factors may be present in non-cholera vibrios may be explained by the " type-specific " serum used in antigenic analysis having been raised against an S-R strain. Certain of Gallut's strains tested with rough cholera serum showed the presence of the rough antigen. It is noted that Bruce White had found that rough non-cholera vibrios isolated from water and other sources reacted in varying degrees with " rough " cholera serum.

Gallut's " pure B " strain was not agglutinated by the Institute's monospecific Ogawa serum and a high-titre serum raised against it did not agglutinate an Ogawa culture. Absorption tests failed to show any relationship with the B antigen of *V. cholerae.*

The opinion is expressed that the existence of pure A and pure B forms is not confirmed. The authors failed to find the type-specific B and C antigens in non-cholera vibrios.

An examination of strains stated to contain certain additional subsidiary factors showed these to be either Inaba or Ogawa forms, or to contain a rough

fraction, or to be non-cholera vibrios. Absorption tests with Burrows's " A E " strains showed these to be typical Ogawa strains.

" It is recommended that, until more work is carried out on the antigenic structure of the vibrios, it would not be wise to introduce any change in the existing methods of preparation of cholera vaccines or in the serological diagnosis of *V. cholerae*. A conservative attitude should be adopted towards the existence of pure ' A ' or pure ' B ' types of vibrios or the reported discovery of 13 different ' O ' factors in the antigenic make-up of cholera vibrios." [See also this *Bulletin*, 1951, v. 48, 257.] *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

KASPER, J. A., COPE, Elizabeth J., LYON, Margaret & WHITE, M. **Report on the Results of Examinations for Intestinal Parasites.** *Amer. J. Pub. Health.* 1950, Nov., v. 40, No. 11, 1395–7.

The authors, in the Department of Public Health, Detroit, studied the incidence of parasitic infections, by means of laboratory examination of faeces. Findings are given in respect of specimens received in 1946, 1948 and 1949 from private physicians and from a clinic which at one stage dealt with displaced persons from overseas, mainly Singapore. The specimens from the latter were received from 1948 onwards and a corresponding increase in the incidence of parasitic infections was noted. However, the results seem to indicate that such an increase also occurred among persons presumed to be native to the locality, and this is to be explained partly by the return of servicemen and the war-time influx of people from the Southern United States.

Three specimens were examined in the case of each patient, at weekly intervals. At least two direct smears were made and all specimens were cultured in " Difco Entamoeba Agar ". Examination of multiple specimens greatly increased the proportion of positive findings : each culture was examined by 2 or 3 parasitologists.

A table shows that more than 60 per cent. of the positive findings for *Entamoeba histolytica* among specimens from 502 persons in the clinic group were obtained from examination of the first specimen submitted : the corresponding percentages for the second, third and fourth to tenth specimens were 15, 12 and 10. It is added that 175 of those in this group whose findings were negative had submitted only one specimen : repeated examination would no doubt have increased the number of positive findings.

Another table shows the percentage of persons harbouring parasites among approximately 650 private patients per annum in 1946, 1948 and 1949 in the group of local residents. These were 8·5, 13·3 and 17·3 respectively. In the group of displaced persons in 1948 and 1949 (222 and 280 persons respectively) the percentages of parasitic infections were 43·2 and 51·7 : these persons had had a greater opportunity of exposure. A table also shows that multiple infestations were much commoner among these persons than among the local patients of private physicians.

A large table gives an analysis of the types and species of protozoal and helminthic parasites encountered in specimens from the two groups over the years in question. There is clearly a direct relationship between the increased incidence of parasitic infestation in the area of Detroit covered and the migration therein of displaced persons from Asia and Europe, harbouring intestinal parasites.

The most important findings related to *Entamoeba histolytica*. Among the displaced persons these amounted in 1948 and 1949 to 15 and 23·2 per cent. of the findings. Among the local population, the corresponding figures for

1946, 1948 and 1949 were 2·5, 4·0 and 9·1. The authors point out that an increase from 2·5 to 9·1 per cent. over such a period of time is significant and they stress the need for increased laboratory investigation and control of the source of infection. *H. J. O'D. Burke-Gaffney*

SAITO, M. **Studies on the Influences of Bacterial Flora upon the Cultivation of *Entamoeba histolytica*. *Kitasato Arch. Exper. Med.*** 1950, July, v. 23, No. 1, 33–6.

For the study of the effect of bacteria on the growth of *Entamoeba histolytica in vitro*, the author initiated cultures in Boeck-Drbohlav medium, with cysts obtained from 18 contact-carriers together with the accompanying bacterial flora. The composition of the latter in various faecal samples was determined by cultivation in appropriate media. A knowledge of the bacterial species predominating in the culture of any given strain of amoebae served as a basis for judging its influence upon the growth of the latter. *Bact. coli* appeared to be the most beneficial species, for all but one strain produced profuse growth of *E. histolytica*. *Bact. alkaligenes* also promoted its growth, but *Bact. aerogenes*, *Pseudomonas pyocyanea*, *B. subtilis* and *Proteus* were not so favourable.

In the course of time, the bacterial composition of some cultures underwent changes which affected the growth of amoebae : its improvement was correlated with an increase in the number of favourable bacteria, while its deterioration was accompanied by a decrease in the latter. *C. A. Hoare*

ISHINO, K. **Studies on the Influences of Intestinal Flora upon the Excystation of *Entamoeba histolytica* in Vitro. I. Resistance of Cysts to various Antiseptics and Method of obtaining Bacteria-free Cysts. II. Influences of Undetermined Intestinal Flora upon Excystation.** *Kitasato Arch. Exper. Med.* 1949, Dec., v. 22, No. 4, 273–5 ; 277–80.

These papers deal with the results of a study to determine the effect of the intestinal flora on the excystation of *Entamoeba histolytica* in culture.

In the first paper the author describes the methods used for freeing the amoeba of concomitant bacteria. Human faeces containing numerous cysts were mixed with water and filtered through fine gauze, after which the filtrate was centrifuged and the supernatant fluid pipetted off. This process was repeated until the fluid was quite clear. The cysts were then concentrated by flotation in sugar solution with a specific gravity of 1,110, which was added to the faecal sediment. This flotation method is claimed to be superior to those in which magnesium or zinc sulphate are used, since sugar does not cause plasmolysis of the cysts and does not impair their vitality.

For disinfection, the cysts were cultivated in media with various concentrations of one of the following antiseptics : antiformin, cresol, bleaching powder, potassium permanganate and corrosive sublimate. The bactericidal effect of this treatment was assessed by subcultivation. Promising results were obtained only with corrosive sublimate, which was successfully used as follows for obtaining bacteria-free cysts. After centrifugation of the faeces, the sediment containing cysts was subjected to the action of 1 : 10,000 solution of corrosive sublimate for one hour at room temperature. The sublimate solution was then removed and saline substituted by repeated centrifugation, after which the sediment was transferred to the culture medium. That this treatment killed the accompanying bacteria but did not affect the viability of the cysts was demonstrated by the absence of bacterial growth in the culture and by the hatching of amoebae from the cysts on addition of faeces without amoebae.

From the second paper it would appear that in some of the cultures treated with corrosive sublimate a small number of bacteria made their appearance. These could be eliminated by addition to the culture medium of 0·01 per cent. of malachite green, which had no influence on the amoebae. Experiments carried out with cultures containing cysts of *E. histolytica* free from bacteria, showed that they do not hatch unless small amounts of the stools are added to the medium. In order to determine whether the bacteria themselves or other factors promoted excystation, cysts free from bacteria were cultivated in media to which were added (1) filtrate of a culture of *E. histolytica* with a mixed flora, or (2) disinfected or filtered stool extract. The cysts failed to hatch under either of these conditions, but excysted on addition to the medium of bacteria from the stock culture. From these results it is concluded that the factors promoting excystation are provided by living bacteria and not by the medium.

C. A. Hoare

Bucco, G. & Chieffi, G. Sull'azione di alcuni componenti e proprietà dell'urina sulle culture di *Entamoeba histolytica*. [**The Action of certain Factors present in Urine on Cultures of** *Entamoeba histolytica*.] *Acta Med. Italica*. 1950, Oct., v. 5, No. 10, 329–30.

Views have differed as to whether *E. histolytica* can or cannot produce inflammatory or other pathological changes of the mucous lining of the urinary organs.

The authors have devised their own culture medium for growing *E. histolytica* and have tested the effects of various *p*H values and the action of ammonium chloride, urea and whole urine respectively on the viability of such cultures. They found that the particular strain of *E. histolytica*, which they had isolated from a case of dysentery and which they used throughout their experiments, was unable to live in urine even when the latter was very diluted. Both urea and ammonia were found adversely to affect the vitality of the *Entamoeba*. The latter remained mobile in a medium at *p*H 4 for 48 hours, and the culture survived and grew at *p*H 5·5.

The authors conclude that urine is harmful to this protozoon. *J. Cauchi*

de Velasco, R. & Amado Ledo, E. Colitis amebiana y cirrosis hepatica. Reporte de un caso. [**A Case of Amoebic Colitis and Cirrhosis of the Liver.**] *Archivos Hospital Universitario*. 1950, Sept.–Oct., v. 2, No. 5, 607–17, 5 figs. on 3 pls. [10 refs.]

"1. A case of amebic colitis associated to liver cirrhosis is reported.

"2. Considerations are made about the possible etiopathogenesis of the hepatic lesion, considering that according to recent publications, it seems that the protein loss present in ulcerative colitis is of greatest importance in producing the associated liver cirrhosis.

"3. The possibility of a similar pathogenesis, in the production of the liver cirrhosis in the case of amebic colitis is suggested."

Proto, P. Un caso di "cistite amebica" da *Ent. coli*. [**A Case of "Amoebic Cystitis" associated with** *Entamoeba coli*.] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Sept., v. 31, No. 9, 671–91.

The English summary appended to the paper is as follows :—

"The writer reports on a case of cystitis caused by amoeba. After a survey of the cases so far described, he comes to the conclusion that the oldest cases

and those not sufficiently supported by necessary documentation may be considered from a historic rather than from a scientific point of view. Only those cases which are supported by all essential data which allow a reliable diagnosis and leave no doubt as to the cause and effect of the disease may be considered as scientifically reliable. He does not believe that the disease is due to a special kind of amoeba gifted with a particular tropism for the bladder, but that this organ may occasionally be infested by the already classified amoeba through the natural and simplest way, the urethra. The treatment was successful. As there do not seem to be any particular characteristics of the disease, the writer is of the opinion that a reliable diagnosis should be made only with the support of laboratory tests."

BLANCO, M. C., RESTA, C. A. & PITTALUGA, J. D. La emetina por via intravenosa como metodo de elección para el tratamiento de la amibiasis. [**Intravenous Emetine as the Method of Choice in the Treatment of Amoebiasis.**] *Rev. Asoc. Med. Argentina.* 1950, Oct. 15–30, v. 64, Nos. 687/688, 457–60.

The authors' description of the details of their treatment show that there is much more in it than mere intravenous emetine. Their method is as follows : *First day* : Subcutaneous injection of 0·02 gm. emetine with 50 mgm. vitamin B_1, to test tolerance of these drugs. *Second to tenth days* : Emetine, 0·04–0·06 gm. with 100 mgm. vitamin B_1 slowly intravenously, some time after meals and with the patient in bed. The mixture may be diluted with 5–10 cc. physiological saline or with ascorbic acid, 0·5–1 gm. Strychnine sulphate 2–5 mgm. at the beginning of each meal (or 1–4 granules of " Strychnal ") ; enterovioform, one tablet of 0·25 gm. after early breakfast (*desayuno*), breakfast (*almuerzo*) and supper. If well tolerated this last may be increased to 6 tablets in the day ; if it causes diarrhoea it should be reduced. Then follows a rest of ten days. Next, amoebarsone (an arsenical of the carbarsone type) 0·25 gm. capsule at the beginning or end of breakfast and supper for ten consecutive days. This may be raised to three capsules daily. Retention enemata of Yatren after a wash-out, for five days. After another rest of ten days the whole cycle is started again. Ten to fifteen days after the conclusion of the second course the faeces are again examined and if amoebae are still found the treatment is repeated. In adults and young persons in good general health, larger doses of emetine are advisable, 0·06 gm. daily in a single injection, or 0·03 or 0·04 gm. morning and evening.

For children the subcutaneous route is used, with dosage according to age, but for those over 10 years of age the intravenous route.

If there is entero-colitis or sign of bacterial infection penicillin (in 300,000–500,000 unit doses) or streptomycin, or both together, and sulphonamides are advised. In patients with low blood pressure strychnine should be given for a few days before the course of emetine is begun ; therefore a general clinical examination and a special cardiovascular examination must be undertaken before starting this treatment. The diet should contain plenty of protein.

The authors have observed disappearance of the amoebae after the first or second course in 80 per cent. of patients [but the number treated is not stated] and they have seen no signs of intolerance to the emetine. Sometimes *E. histolytica* cysts are seen in the stools after the treatment has been pressed. They believe that association with vitamin B_1 favours tolerance of the emetine.

H. Harold Scott

D'IGNAZIO, C. & TERMINE, L. "Conessina ed Hollarene" nel trattamento dell' amebiasi in Etiopia. (Nota preventiva). ["**Conessine and Hollarene" in the Treatment of Amoebiasis in Ethiopia.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Nov., v. 31, No. 11, 823–8. English summary (6 lines).

A general review.

FULTON, J. D., JOYNER, L. P., KING, H., OSBOND, J. M. & WRIGHT, Jean. **Amoebicidal Action and Chemical Constitution.** *Proc. Roy. Soc.* Ser. B. 1950, Oct. 31, v. 137, No. 888, 339–66. [33 refs.]

The authors give an interesting and critical historical account of the laboratory investigation of amoebicides from both biological and chemical points of view. They describe their own methods of biological assay. They have not made routine use of artificially infected rats, as has been done by JONES [this *Bulletin*, 1947, v. 44, 313 and 1069] and by GOODWIN *et al.* [this *Bulletin*, 1948, v. 45, 521], because they have found that natural infection with *Entamoeba muris* complicates diagnosis and the use of newly weaned rats involves too high a mortality frequently associated with bacteriaemia. They have therefore confined themselves to *in vitro* studies, using the methods introduced by DOBELL and his colleagues. Two series of tests were employed, one in which a mixed bacterial flora was associated with the amoebae, and one in which the single organism, *Bact. coli*, was present. The results given by these two types of *in vitro* tests showed some correlation in so far as a high amoebicidal activity in the one was usually paralleled by similar high activity in the other, and the authors remain in some doubt as to the relative value of the two types of test. The test in the presence of mixed bacterial species is easier to carry out and more closely simulates conditions in the intestinal tract, but it may be impossible to tell whether the action of a drug is direct on the amoebae or indirect through an effect on one or more of the essential bacteria present. The test involving a single bacterial species has fewer uncontrolled factors and a specific action on the amoebae can be detected, but it has the disadvantage that a substance bactericidal for *Bact. coli* cannot be used in the test, whereas such a property may be of the utmost value in the treatment of amoebiasis [HARGREAVES, this *Bulletin*, 1945, v. 42, 895].

Over 400 compounds, of diverse organic types, were investigated. Early in the work the high activity found in a compound originally supplied by Imperial Chemical Pharmaceuticals, Ltd., for test against typhus suggested that it would be worth exploring derivatives of 2-anilino-4-chloroquinoline and 4-chloroquinaldine with various types of basic side-chains in place of the reactive chlorine atom in the 4- position of the quinoline nuclei. Eighty-seven such compounds were synthesized. Preparative details are given, and tables show the effects of (1) replacement of the chlorine atom by various primary and secondary amines; (2) replacement of the β-chloro atom in the 4-NH.CH_2.CH_2Cl derivatives by primary amines; (3) replacement of the β-chloro atom by secondary bases; (4) certain *bis*-bases isolated as by-products during preparation of some of the other bases; and (5) quaternary salts involving a piperazine ring.

A number of the compounds were found to have *in vitro* activity slightly inferior to that of emetine and are deemed worthy of further study.

E. M. Lourie

MCCARTEN, W. G. & GRIFFIN, A. M. **Observations on the Amylolytic Activity of *Entamoeba terrapinae*.** *J. Bacteriology.* 1950, Dec., v. 36, No. 6, Sect. 1, 517–22. [11 refs.]

ELSDON-DEW, R. & FREEDMAN, L. **Coccidiosis in Natal. Infections with *Isospora hominis* (Rivolta).** *South African J. Clin. Sci.* Cape Town. (Incorporating *Clin. Proc.*) 1950, Sept., v. 1, No. 3, 185–95, 4 figs. [38 refs.]

A world map of *Isospora* infection shows that the parasite is well distributed all over the world wherever the conditions of hygiene are unsatisfactory. Parasitological examinations should be carried out by means of the zinc sulphate technique without which many infections are missed.

In Durban the parasite was first mentioned in a paper by NEWHAM and ROBERTSON in 1922 [see this *Bulletin*, 1923, v. 20, 448]. Elsdon-Dew discovered another in a soldier returned from the Middle East in 1943, LIEBERMANN a third in a South African European in 1945 [this *Bulletin*, 1946, v. 43, 334]. Two others were discovered early in 1949, but it was not until the use of the zinc sulphate technique was adopted that any large number of cases came to light.

The present series of 18 cases shows that many others must have been missed in the past.

The oocysts in this series were remarkably consistent as regards size. The flask shape previously shown by Faust is the exception rather than the rule.

As the majority of these infections were discovered during an investigation for *Entamoeba histolytica* it is not surprising that the clinical features varied. As regards treatment it is probable that infection with *Isospora* is self-limiting.

P. Manson-Bahr

LUIS CARRI, E. Las formas circulatorias de la Giardiasis intestinal. [**Circulatory Forms of Intestinal Giardiasis.**] *Semana Méd.* 1950, Dec. 14, v. 57, No. 50, 1150–53. [43 refs.]

The author describes a condition, and gives notes of three illustrative cases, in which palpitation, praecordial pain or distress, arhythmia and tachycardia were found in association with the presence of *Giardia intestinalis* in the faeces. When the parasite disappeared from the stools as the result of treatment, the cardiac signs cleared up also and the electrocardiogram became normal. In one patient *Dientamoeba fragilis* and *Endolimax nana* were also present.

H. Harold Scott

DE ALMEIDA, C. L. Disenteria balantidiana num doente do sono. [**Balantidial Dysentery in a Patient with Trypanosomiasis.**] *Gaz. Méd. Portuguesa.* 1950, v. 3, No. 4, 789–92, 1 chart & 2 figs.

The English summary appended to the paper is as follows :—

" For the first time in Portuguese Guinea the existence of balantidiasis has been described, with reference to a case manifesting dysenteric symptoms, in a trypanosomiasis patient in the nervous stage. The patient died in the acute stage of dysentery, but as he suffered at the same time from ankylostomiasis, with signs of nutritional deficiency, it was not possible to determine the pathogenic power of the *B. coli*, but merely to state the case."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

BALTAZARD, M., BAHMANYAR, M. & MOFIDI, C. *Ornithodorus erraticus* et fièvres récurrentes. [*Ornithodorus erraticus* **and Relapsing Fevers.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 595–601. [17 refs.]

The authors discuss various records of *Ornithodorus erraticus* which seems to have two well-marked varieties, a large form restricted to the Mediterranean region, and a small form with a much wider distribution, occurring in Africa from Morocco through the Sahara to French West Africa, and also in Iran, and around the Persian Gulf. For the most part the distribution of the two varieties does not overlap and in nature they are infected with different strains of spirochaetes.

The larger variety, the typical *O. erraticus*, transmits *Spirochaeta hispanica*, while the smaller variety is associated with a number of spirochaetes including *S. crocidurae*, *S. microti* and *S. merionesi*. Transmission experiments show that each of the two varieties of *O. erraticus* exhibits a high specificity for the spirochaete or spirochaetes that it transmits in nature, and only exceptionally is able to transmit spirochaetes carried by the other variety. This seems to support the view that these two forms of *O. erraticus* should be regarded as distinct species. *E. Hindle*

FONTAN, VERGER, BENTÉGEAT, MARTIN & DUBREUIL. Sodoku chez deux enfants de 15 mois et 13 ans ; guérison par l'auréomycine. [**Rat Bite Fever in Two Children, of 15 Months and 13 years, cured by Aureomycin.**] *J. Méd. de Bordeaux.* 1950, Dec., v. 127, No. 12, 834–5.

YAWS

DE AQUINO, U. M. Estudos comparativos entre a reação de fixação de complemento e a reação de floculação (com cardiolipina) no sangue e no liquor de boubentos. [**Fixation of Complement and Flocculation (with Cardiolipin) in Serum and Cerebrospinal Fluid in Yaws.**] *Brasil-Médico.* 1950, Nov. 4 & 11, v. 64, Nos. 44/45, 256–8, 4 figs.

Good reports on the use of cardiolipin antigen in the serological diagnosis of syphilis led the author to try it in cases of yaws. Samples of the blood and of the cerebrospinal fluid were obtained from 18 yaws patients in various stages of the disease. Kolmer's test with the Bordet-Ruellen antigen was used for the complement fixation, and the Kline test with cardiolipin for the flocculation. With the sera all gave a positive to both tests. Two of the spinal fluids had to be left out of the reckoning ; of the remaining 16, twelve were negative, four positive to both. In a table giving a comparison of the results it is shown that the flocculation reaction with cardiolipin was much more sensitive than the complement fixation reaction with Bordet-Ruellen antigen, while with the cerebrospinal fluid the sensitivity was about the same with cardiolipin as with the Bordet-Ruellen antigen, and the author concludes that the Kline test with the use of cardiolipin antigen is more sensitive, more rapid, and more simple and, therefore, to be preferred in testing yaws sera. *H. Harold Scott*

AMPOFO, O. & FINDLAY, G. M. **Oral Aureomycin in the Treatment of Tropical Ulcers and Cancrum Oris.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Dec., v. 44, No. 3, 307–10.

—— & ——. **The Treatment of Yaws by Aureomycin.** *Ibid.* 311–13. [12 refs.]

—— & ——. **Chloramphenicol in the Treatment of Yaws and Tropical Ulcer.** *Ibid.* 315–18.

These three papers, based upon observations on Africans in the Gold Coast, may be considered under two main headings :—

(*A*) *Treatment of tropical ulcer.*

Aureomycin was given by mouth in divided daily doses of 0·75–1·5 gm. for 3–4 days to 8 children. " A piece of lint was placed on the ulcer." Vincent's fusiform bacilli and spirochaetes were present in all lesions but were not found 24 hours after the commencement of treatment. Healing was said to be rapid and complete ; in two cases only is the time taken recorded, namely, 3 weeks and 24 days. No " fresh breakdown " was observed 6–12 weeks later. No toxic reactions were observed.

A case of cancrum oris also reacted favourably to 0·75 gm. of aureomycin daily over 7 days.

Chloramphenicol was given by mouth in divided daily doses of 1·5 gm. for 7 days or 2 gm. for 4 days, without local treatment to the ulcer. Spirochaetes and fusiform bacilli were not found 2–4 days after treatment began and healing was complete in 3 weeks in 5 of the 6 cases treated. No recurrence was observed in 3 cases after 2 months. In one case a diffuse erythematous itching rash appeared on the 3rd day of treatment but disappeared within 48 hours of completion of the 7-day course. No other toxic reactions were observed.

[These results are interesting and of practical value.]

(*B*) *Treatment of yaws.*

Aureomycin was given by mouth in divided daily doses of 0·75 gm. for 7 days to 5 children with secondary yaws skin lesions. These had healed 7–8 days after treatment began and no relapses had been observed from 2½ to 6 months later. Aureomycin was given by mouth to two other patients regarded as " late secondary or early tertiary yaws " in doses of 1·5 gm. daily for 3 and 7 days with less spectacular results. The serum Kahn reaction after 6 months in one patient was negative and in another was " very doubtfully positive " ; in all patients it was positive before treatment. No toxic reactions were observed.

" Aureomycin may thus be superior to penicillin in causing serological change in yaws when given in short doses." [This suggestion is scarcely warranted on the data recorded by these authors.]

Chloramphenicol was given by mouth in divided daily doses of 1·5, 2 and 3 gm. for 7 days to 4 children with secondary yaws and one with the primary yaw only. Healing was complete by the end of treatment. The serum Kahn reaction was positive in all patients before and 6 weeks after treatment.

[Until a more thorough and prolonged trial of the effectiveness of these antibiotics in yaws has been made the value of the present reports on this subject is limited ; other limited trials have already been reported by the author, this *Bulletin*, 1950, v. 47, 631.] *C. J. Hackett*

GUIMARÃES, F. N. & TRAVASSOS, J. Ação da terramicina na bouba (Framboesia, pian, yaws). [**Effect of Terramycin on Yaws.**] *Hospital.* Rio de Janeiro. 1950, Aug., v. 38, No. 2, 295–9.

The following is a translation of the authors' summary :—

Four cases of yaws with primary and secondary lesions were treated with terramycin in doses varying from 5 to 15 gm. Clinical cure of infective lesions was observed in 6 to 16 days from the beginning of treatment. Treponemata were still present on the surface of lesions 72 hours after the first dose in one case and 48 hours after it in two cases. No modification was observed in the strongly positive serological reactions during the short observation period after treatment. *H. J. O'D. Burke-Gaffney*

LEPROSY

POINDEXTER, H. A. **A Note on Leprosy in Liberia.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 369–72, 1 fig.

Surveys have been made in representative areas of Liberia for some years and about 1,000 cases are known, or 0·5 per thousand of about 2,000,000 people ; at least an equal number of unrecognized cases may safely be presumed. There is no leprosy hospital and segregation is not enforced, but there are three leprosy colonies or villages with 200 to 300 resident patients in each and several small stations for out-patient treatment ; most of the known cases thus obtain treatment twice a week. Helminthic and other complications are treated. Chaulmoogra treatment has mainly been used. Diasone has been used in 12 cases with fewer complications than after chaulmoogra treatment so the future is more hopeful. *L. Rogers*

INNES, J. R. **Leprosy and Leprosy Work in East Africa.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 359–68.

MANALANG, C. **Leprosy and Biblical " Zaraath ".** *Bull. Philippine Pub. Health Ass.* 1950, July, v. 1, No. 7, 13–20. [Refs. in footnotes.]

AUSTIN, C. J. **Fiji Leprosy Hospital, Makogai (Annual Report for the Year 1948).** *Fiji, Legislative Council. Council Paper No. 25.* 1949, Appendix 3, 16–19.

In 1948, 73 new patients were admitted, 52 were discharged as " disease arrested " and 40 died ; four-fifths of the last were lepromatous patients. Of those discharged, 94·2 per cent. had neural disease, mostly in the early stage ; only 3 with lepromatous lesions were discharged. Tuberculosis was the most important complicating disease. Sulphone drugs were only available during the last two months of the year and they had a good effect in clearing old ulcerations which had resisted chaulmoogra preparations. *L. Rogers*

AUSTIN, C. J. **Fiji Leprosy Hospital, Makogai (Annual Report for the Year 1949).** *Fiji, Legislative Council. Council Paper No. 24.* 1950, Appendix 3, 16–22.

In 1949 there were a total of 92 admissions from the various South Pacific Islands, which are provided for by the hospital at Makogai ; 5 of these were at once discharged as incorrectly diagnosed. Of the remainder 39 were tuberculoid and 48 lepromatous. Of 48 discharged, 33 were Indians, who

react better to treatment than South Sea Islanders. None of the discharged patients had received sulphone treatment as a two-year probationary period is required before discharge. Among the 40 deaths the most frequent causes were leprosy *per se*, tuberculosis and renal disease, as is usually the case. The sulphone treatment in the form of sulphetrone was used in 444 patients, all cases positive bacteriologically, with the important result that the hospital was emptied of all chronic lepromatous patients with ulceration. Improved cases, including quiescent ones, numbered from 65 to 74·2 per cent., as compared with 20·2 to 57·4 per cent. in the previous year, including the figure of 65 per cent. of lepromatous cases against 62·2 per cent. of tuberculoid ones ; this is contrary to previous experience. Sulphetrone, however, has a marked toxicity and would be much too dangerous for routine use without regular examination for anaemia. Further, 45 per cent. of the patients on this drug were unable to stand full doses on account of frequently repeated severe reactions and it was not found possible to adopt Cochrane's advice to continue the treatment throughout the reaction. Desquamative dermatitis may occur and go on to generalized exfoliative dermatitis. The sulphones nevertheless are on the balance a very real advance in treatment. *L. Rogers*

Gonzalez Prendes, M. A. & Ybarra Perez, R. La lepra en Matanzas. [**Leprosy in Matanzas.**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1950, Sept., Oct., Nov. & Dec., v. 6, No. 3, 101–18. [39 refs.]

Matanzas, a Province of Cuba, was the lurking place of corsairs and smugglers from the latter years of the 16th century, but leprosy does not seem to have been known there until a hundred years later when slaves were being brought in from Africa. Leprosy was then known to be present in Havana and many persons had by that time come to Matanzas from Havana. By 1855 Piña was able to record that leprosy was fairly widespread in Cuba. Nevertheless, until 1945 there was no treatment centre for these patients in Matanzas ; they were sent to Santa Clara or Havana.

After preliminary remarks on the history of the disease in Cuba and the meteorology of the Province, the authors state that there are 148 ambulatory cases among a population of 361,079, or 4·1 per 10,000. They are dispersed among 22 municipalities, Matanzas itself accounting for 37, Cárdenas for 23, Manguito for 16 and Perico for 11 ; none of the others has more than 9, and five have only one each. In addition, there are 19 in hospitals, 16 in Havana and 3 in Oriente. One hundred-and-eight of the 148 (72·9 per cent.) are between the ages of 16 and 50 years and another 31 (20·9) are between 50 and 70 years. Ninety-one (71·49 per cent.) are males, 56 (37·84) are females ; in one the sex is not stated. One hundred-and-thirteen are whites, half-castes number 19 and negroes 13 ; 89 are known to be under treatment ; 98 are of the lepromatous form, 15 tuberculoid, 18 non-characteristic, 17 not known. There are 385 living contacts, 261 with 67 of the lepromatous form, 36 with 7 tuberculoid, 56 with 11 undifferentiated, and 32 others. *H. Harold Scott*

Gomes, J. M. & de Souza, L. A. Cultures cromogénicas isoladas de lepromas murino e humano. [**Chromogenic Cultures isolated from Murine and Human Lepromata.**] *Arquivos Facul. de Hig. e Saude Pública Univ. de São Paulo.* 1949, June, v. 3, No. 1, 3–28, 13 figs. (11 coloured). [15 refs.] English summary.

Using either 5 per cent. glycerin agar, glycerin broth or Petragnani's medium the authors have succeeded in isolating certain acid-fast and chromogenic

organisms from rat lepromas and from human cases. At first they were smooth, reddish-yellow in colour and generally not acid-fast, but later subcultures became drier, more acid-fast and more yellow in colour ; the cultures from a human case are well shown in a coloured plate. When the cultures are kept for some time—it may take as long as 7 months—the non-acid-fast organisms become fewer and only the acid-fast persist and in later subcultures on fresh Petragnani medium are found what the authors call "fungiform bodies", but only if they have been subjected to this preservation and drying process. The individual bacteria may appear as homogeneous acid-fast rods, as splitting up, as mere granules, and finally as particles—acid-fast dust. The changes are well shown in coloured plates. *H. Harold Scott*

DASSEN, R. & DI STEFANO, R. Forma subaguda de lepra simulando a la mononucleosis infecciosa aguda. [**Subacute Leprosy simulating Acute Infectious Mononucleosis.**] *Rev. Asoc. Med. Argentina.* 1950, Oct. 15–30, v. 64, Nos. 687/688, 465–7, 1 fig.

For many who are not very familiar with the disease and even some who have had considerable experience of leprosy the diagnosis is not always easy ; the bouts of fever, cutaneous lesions, glandular enlargement, nervous and "rheumatic" symptoms are very likely to mislead.

The patient whose case is recorded here presented symptoms of fever, splenomegaly, gland enlargement, erythematous eruption and an atypical blood picture. The diagnosis of infectious mononucleosis was made and treatment consisted of penicillin and vitamin C. The fever and adenitis cleared, but a macular erythema of the legs remained and in time extended over the thorax, abdomen and shoulders. After 8 days the fever returned and the glands again became enlarged, in neck, axillae and groins. This led to further examination of the skin lesions and Hansen's bacillus was at once discovered. *H. Harold Scott*

FARINA, R. Deformidades do dorso do nariz na lepra ; correção com enxerto ósseo. [**Deformities of the Dorsum of the Nose in Leprosy. Their Repair with Bone Grafts.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Sept., v. 18, No. 3, 101–10, 8 figs. [21 refs.]

The English summary appended to the paper is as follows :—

"The author presents forty two cases of nasal deformities from leprotic origin. This work is concerned with deformities of the dorsum of the nose. The author, also states, that he no longer uses acrylics, based on biological knowledge.

"On 42 patients the repair was performed with osetoperiosteal graft taken from the crest of the tibia. The grafts were always autoplastics and nomotopics. It seems that the technique employed by author is original. The percentage of bad results is 11·9%."

CAMPOS R. de C., J. & MOLINA S., M. **Visceral Tuberculoid Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 351–8, 4 figs. on pl. [23 refs.]

The histological findings in liver biopsies in seven cases of leprosy are dealt with in this paper : five of the patients had tuberculoid leprosy, with reactions in three, two were of the undifferentiated form. The authors prefer to perform

abdominal section to obtain adequate portions of the liver for examination. In six of the cases characteristic tuberculoid follicles were found, which the authors attribute to the leprosy bacillus ; in one undifferentiated case a chronic infiltration was present. These findings indicate that in tuberculoid cases the infection is not confined to the skin, nerves and superficial lymph nodes, but also involves the deep organs. *L. Rogers*

WADE, H. W. **Reactions to Tuberculins in Leprosy. A Review.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 373–88. [38 refs.]

This is a useful, but highly technical, paper by an expert in the subject. It should be read in the original by those interested and only his conclusions can be given here. A good summary of the previous literature is given with a large number of references. With Koch's Old Tuberculin it is not known whether non-specific reactions can be produced in lepromatous cases. Skin tests by the von Pirquet method afford no evidence that leprosy infection may give rise to false positive reactions. Diagnostic tests by the Mantoux method are mostly of a similar tenor. When purified protein derivatives have been used there is a tendency to fewer reactions in lepromatous leprosy than with other forms and less tendency to cause nonspecific reactions with large doses than with the use of OT. Tuberculin-like products of other mycobacteria show lowered reactivity in lepromatous cases. One report showed that children living in contact with lepromatous cases may be more reactive to tuberculin than are contacts with tuberculoid cases. Further investigations with varying doses of different antigens might be profitable in the elucidation of the unexplained lepromin anergy characteristic of lepromatous cases. *L. Rogers*

SOUZA CAMPOS, N., ROSEMBERG, J. & AUN, J. N. Da relação imunobiológica entre tuberculose e lepra. II. Da inter-relação entre as reações tuberculínica e lepromínica em filhos de doentes de lepra. [**Immunobiological Relation between Tuberculosis and Leprosy. II. Relation between the Mantoux and Lepromin Tests in Children of Leprous Parents.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Sept., v. 18, No. 3, 117–27. English summary.

This is a study of the reaction of 185 children, between the ages of 2 and 16 years, to tuberculin (Mantoux 1 : 10) and lepromin, in an institution in São Paulo ; 93 were boys, 92 were girls. One hundred and forty-eight had been removed from contact with their parents from birth, though born in a leprosarium ; the other 37 had been in contact with their parents for periods ranging from one month to 6 years. The Mantoux test was carried out in a strength of 1 : 1,000 and 1 : 10 tuberculin in December 1949 and the Mitsuda test in October the same year.

Of the total 185, 45 (24·3 per cent.) were positive to the Mantoux test 1 : 10 and 129 (69·7 per cent.) to lepromin. Of the 148 without previous contact with their parents, 31 (20·9 per cent.) gave a Mantoux positive and 95 (64·1) a positive Mitsuda. Of the 37 with previous contact 14 gave a positive Mantoux and 34 a positive Mitsuda. All the 45 Mantoux-plus gave a positive Mitsuda (2±, 23+, and 20++) ; of the 140 Mantoux-negative 84 were Mitsuda positive (23±, 43+, 18++). In other words, in 45 both were positive, in 56 both were negative ; 84 were Mantoux-negative, Mitsuda-positive.

The positive Mitsuda reaction among the non-contact cases is ascribed to infection in the Institute. Since all the Mantoux-positive gave a positive Mitsuda as did also some of the non-contact cases, it was thought that the

tuberculous infection might be responsible for the reaction. Nevertheless the lepromin reaction is clearly, from the above results, independent of the tuberculin and it is argued that the primary infection by *Myco. tuberculosis*, when later the subject starts reacting to lepromin, results in development of tuberculin sensitivity, " so that the co-existence of the positive Mantoux and Mitsuda tests reflects simply the exteriorization of two independent phenomena. . . .".

H. Harold Scott

ROSEMBERG, J., AUN, J. N. & DE SOUZA CAMPOS, N. Da relação imunobiológica entre tuberculose e lepra. III. A lepromino-reação em crianças de descendência não leprosa vacinadas com BCG por via oral. Dissociação entre alergia tuberculínica e reação de Mitsuda. [**Immunobiological Relation between Tuberculosis and Leprosy. III. The Lepromin-Reaction in Oral BCG-Vaccinated Children : Dissociation between Tuberculin-Sensitiveness and Mitsuda's Test.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Sept., v. 18, No. 3, 128–43, 3 figs. English summary.

This is the third of an interesting series of papers on the immunological interrelations between tuberculosis and leprosy. The present study is based on 36 children at a São Paulo institution, all children of leprosy patients but isolated at, or soon after, birth. They were vaccinated with BCG ; 13 were given orally a single dose of 0·1 gm., 23 had 0·01 gm. daily for a week, 0·02 gm. daily for the second week, 0·04 gm. daily in the third week and 0·1 gm. daily during the fourth week, or 1·19 gm. in all. Tests were made monthly and 25 reacted positively at different intervals to Mantoux 1 : 10, eleven remained negative. Ten months later the Mitsuda test was carried out and was found to be positive in all the 36, some reacting as early as the second day, most on the 11th and the latest on the 30th.

The conclusion is drawn that, since a positive lepromin reaction indicates resistance to leprosy infection and since vaccination with BCG is followed by a positive Mitsuda reaction, mass vaccination with BCG may, and should, prove of service in the prophylaxis of leprosy. *H. Harold Scott*

DE SOUSA CAMPOS, N. Patologia de la lepra. Consideraciones en torno de la immunidad. [**Pathology of Leprosy : Observations on Immunity.**] *Sesiones Dermatologicas en Homenaje al Profesor Luis E. Pierini. Buenos Aires, 11 al 13 de noviembre de 1949.* pp. 181–9. 1950. Buenos Aires : Lopez y Etchegoyen S.R.L., Junin 863.

COCHRANE, R. G. **A Critical Review of the Present Position of Sulphone Therapy in Leprosy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Dec., v. 44, No. 3, 259–70.

This paper contains little new except to state the author's present views on sulphone therapy. In India early lepromatous cases respond effectively to adequate hydnocarpus therapy and show a satisfactory percentage of negatives. Sulphone therapy is indicated in all lepromatous cases. Where cost is important in early cases hydnocarpus treatment should be used and sulphones reserved for cases that have not responded to two years of treatment and for relapses. On account of its low cost oral DDS can be used if laboratory facilities are available and under strictly controlled conditions, but under less satisfactory conditions 50 per cent. aqueous sulphetrone should be given by injection. Bacteriological improvement is very slow with sulphones. DDS is also effective in tuberculoid leprosy. In neural leprosy the prevention and alleviation of deformities is essential. *L. Rogers*

DHARMENDRA, DEY, N. C., BOSE, R. & KAPUR, P. L. **The Intramuscular Administration of Sulphetrone in the Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 309–31, 4 figs.

In this paper the intramuscular administration of sulphones is advised because when they are given orally a large proportion is unabsorbed and wasted. A number of solutions or suspensions of the drugs have been tried and they are described in detail; the following conclusions are arrived at. Parenteral administration causes less anaemia, which results from intestinal changes produced by these drugs. Detailed studies of absorption and the blood levels which resulted in positive lepromatous cases were made with various preparations, such as aqueous solution, suspensions in hydnocarpus and arachis oils, with or without wax, and an emulsion of hydnocarpus oil and water. A watery solution of sulphetrone is rapidly absorbed and is found in the blood 5 minutes after injection, increases up to 2 hours and then begins to decline after a single dose, and the blood is practically free in 72 hours after a 2 gm. dose. Preparations in water or oil give ultimately the same results. To maintain the same concentration in the blood the intramuscular dose is only one-fifth of the oral one. Renal excretion is rapid and about half the given dose is excreted in the first 24 hours; the urine concentrations are much higher than the blood concentrations with all preparations. The watery solution is the first choice, the hydnocarpus emulsion the next best. Suspensions have no advantages and they are more difficult to inject and more irritant. The most suitable doses are 1·0 gm. injected daily, 1·5 gm. on alternate days or 2 gm. twice a week if well tolerated. Anaemia and toxic symptoms have been less after injections and this form of administration is more economical.

L. Rogers

AUSTIN, C. J. **Effects of Sulphetrone Treatment in Fiji.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 345–9.

LOWE, J. **Diaminodiphenylsulphone in the Treatment of Leprosy.** *Lancet.* 1951, Jan. 6, 18–21.

In this further paper the author reports that he has extended the DDS treatment to 500 cases since his last paper of a few months ago [see this *Bulletin*, 1950, v. 47, 475] with very similar results. He now advises the following courses of treatment for widespread use in Nigeria with little medical supervision. Either daily doses of 100 mgm. on six days a week for six weeks and then 200 mgm. daily, or doses of 100 mgm. twice-weekly, rising by 100 mgm. a week to 400 mgm. twice-weekly. The reduced doses do not appear to be appreciably less effective. The cost per patient is 6–9 shillings a year. The toxic effects under this treatment are comparable to those of other sulphones. *L. Rogers*

RAMANUJAM, K. & SMITH, M. **Haemolytic Anaemia during Treatment of Leprosy with Diaminodiphenylsulphone by Mouth. Report of a Case.** *Lancet.* 1951, Jan. 6, 21–2.

A case is recorded to show that the oral administration of DDS in the doses mentioned above may not be without serious toxic effects. An Indian with major tuberculoid leprosy of three years' duration, and normal blood count and physical condition, was given 0·1 gm. doses daily for thirteen days, 0·2 gm. for ten days and 0·3 gm. for thirteen days. After 35 days nausea, weakness and low fever appeared and after 36 hours' further treatment a blood-sulphone level of 1·3 mgm. per 100 ml. was found, which is within the normal limits.

The treatment was discontinued, a total of 7·1 gm. of the drug having been taken. Acute haemolytic anaemia developed ; infective hepatitis was ruled out because the liver function tests gave normal readings. A later attempt to renew the treatment with only 25 mgm. doses was made but the symptoms recurred. *L. Rogers*

Muir, E. **Preliminary Report on 4 : 4′Diaminodiphenyl Sulfone (DDS) Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 299–308.

In this paper a year's trial of DDS in leprosy in India is reported. Doses as small as 0·05 gm. daily were found to be as effective as the larger usual doses of diasone, so 0·1 gm. in 4 cc. acacia mucilage was given orally as larger doses produced anaemia. Five tuberculoid cases improved considerably. The total number, including 89 lepromatous cases, showed 40 improved and 26 much improved on similar lines as in the case of other sulphones. Lepra reactions were followed by improvement, but necessitated reduced doses for a time. The treatment is safe in the doses used except in debilitated subjects. In 50 cases treated for over nine months much improvement resulted in 48 per cent. The cheapness of DDS should make it available to a larger number of patients. *L. Rogers*

Floch, H. & Rist, N. Action thérapeutique anti-lépreuse de la sulfone-mère et des sulfones complexes. [**Action of DDS and Sulphone Compounds in Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Sept., v. 18, No. 3, 111–16. [14 refs.]

The parent sulphone DDS—diamino-diphenyl-sulphone—is more active than, and has many advantages over, other sulphone compounds in the treatment of leprosy. In fact, the others become hydrolysed in certain conditions and give rise to DDS which increases their action *in vitro*. In lepromatous forms of the disease it is claimed that DDS is active in smaller doses than the other sulphone compounds ; other advantages are that its toxicity is more easily controlled whereas the toxicities of the others vary irregularly ; the activity is the same in different patients and also the same whether it is administered *per os* or intramuscularly, and both routes may be used ; finally, the cost is less. *H. Harold Scott*

Floch, H. & Destombes, P. La thérapeutique de la lèpre par une sulfone monosubstituée, la Succinyl-diamino-diphényl-sulfone ou 1500 F. [**Treatment of Leprosy by a Mono-Substituted Sulphone, Succinyl-diamino-diphenyl Sulphone, 1500 F.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 566–73.

The authors report good results in leprosy from the use of 1500 F and think that as a mono-substituted sulphone it is more active than di-substituted ones such as sulphetrone. The new preparation also has a greater effect on lepra bacilli and appears to be less toxic than former drugs against leprosy, especially DDS. It can be given orally commencing with 0·2 gm. and increasing by the same amount weekly up to 1·0 gm. with rest for one week every two months. Intramuscularly it is given in similar doses every second day (0·25 gm. to 2 gm. in 5 weeks) and intravenously in the same doses daily increased to 1 gm. daily by the end of four weeks ; 2·5 gm. daily can be reached safely. In the course of 17 months 43 lepromatous, 4 indifferent and 8 tuberculoid patients have been treated and all have improved, usually very rapidly in a similar manner to that

obtained with previous sulphones. Reactions were most frequent in lepromatous cases after oral use. Lepra bacilli decreased in number and showed morphological changes with breaking up into granules. The usual precautions are required as regards anaemia and its treatment by iron preparations. The authors think that the action of the drug on lepra bacilli is obtained without its breaking down into DDS, for the present drug has a direct action on the bacilli *in vivo*, and possibly *in vitro*. It is better tolerated by injection than after oral use. The authors conclude that monosubstituted sulphones are more active and less toxic than other sulphones yet used. *L. Rogers*

Ross, Hilary. **Studies of the Absorption, Excretion, and Distribution in the Body of the Sulfones used in the Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, July–Sept., v. 18, No. 3, 333–44.

During eight years of sulphone treatment at the Carville Leprosarium, U.S.A., it has been found that effective doses are 5 grammes daily intravenously of promin, 1 gramme orally of diasone, 3 grammes of promacetin and 3 or 4 grammes of sulphetrone, as determined by toxicity studies and determinations of blood and urine sulphone levels. These also show the necessity of two weeks' rest after every two months' active treatment as the drugs accumulate in the blood. In the case of sulphetrone only 50 per cent. is absorbed from the bowel. The different drugs are retained in the blood up to 14 days after cessation of treatment and occasionally up to four weeks. Promin given intravenously does not appear in the faeces. Relatively rapid excretion takes place through the kidneys. Different patients exhibit marked variations in ability to absorb the drugs. Concentrations in the skin are much the same after oral or intravenous use. The drugs tend to be stored in the skin, muscle and other tissues with very similar concentrations in leprous or healthy skin. At post mortems concentrations were found in the liver, spleen, kidneys, skin and nerves.

L. Rogers

HELMINTHIASIS

Tripodi, P. La ricerca di uova di elminti nelle feci con il metodo di arricchimento "AEX". [**The AEX Method of Enrichment in the Examination of Faeces for Helminth Ova.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Sept., v. 31, No. 9, 644–54. [25 refs.] English summary (6 lines).

The author has examined the faeces of 200 persons for the presence of helminth ova by using the methods of (i) direct microscopical examination of fresh faeces, (ii) Telemann's enrichment process as modified by De Rivas, and (iii) the AEX enrichment process which includes treatment of the specimens with hydrochloric acid followed by ether and xylol, spinning in a centrifuge and examining the sediment. In the last method, the author found that the glass beads tend to break the ova and softer means of stirring (Thoulet) have been found preferable. The ova tend to burst when kept in distilled water for 12 hours and it has been found better to reduce this period to ½–1 hour.

The results are tabulated as follows :—

With direct examination, *Ascaris* ova were found in 7·5 per cent. of the specimens, *Ancylostoma* ova in 2·5 per cent., the ova of *Trichuris* in 6 per cent and those of *Hymenolepis nana* in 0·5 per cent. With Telemann's (modified) enrichment method, the corresponding percentages were 13, 3·5, 9·5 and 0·5 respectively. With the AEX process these percentages were 19, 4·5, 10·5

and 0·5 respectively. The last method has proved particularly sensitive in demonstrating the ova of *Ancylostoma* and the unfertilized ova of *Ascaris*, though the latter were invariably missed when de Rivas's modification of Telemann's process was used. The fertilized ova of *Ascaris*, the ova of *Hymenolepis nana* and those of *Trichuris* were all easily demonstrated by the AEX enrichment method, which is simple to carry out. *J. Cauchi*

Maia, C. da C. Helmintas em novecentos recrutas do arquipélago da Madeira. [**Helminthiasis among Nine Hundred Madeira Recruits.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 283–323, 2 figs. [18 refs.] English summary.

The first part of this long article, comprising a quarter of the whole, is taken up by records of the findings of previous investigators on helminthiasis in Portugal in subjects from 2 to 19 years of age, information which, as the author rightly says, is "of no use for general survey", especially for that among young adult recruits. He goes on to record his own findings on examination of the faeces of 902 recruits in Madeira and 8 from Porto Santo. Various methods of examination were used : direct, by the Willis, the Faust and the Charles and Barthélemy techniques. The last [the method is not detailed] is very good, he says, for detection of amoeba cysts and ova of *Trichuris*.

The results are analysed in minute detail and give the numbers of persons found positive for each of the following : *Trichuris trichiura*, *Ascaris lumbricoides*, Ancylostomidae, *Hymenolepis nana* and *Strongyloides stercoralis* by all four techniques and by each technique separately. The value of information so obtained must be discounted because the numbers examined by each are not comparable. Thus, all 910 were examined by the direct method, 884 by the Willis technique, 233 by Faust's method and only 29 by the Charles and Barthélemy. For some of the worms the Willis proved the better in revealing a higher percentage positive, for others the Faust method. An example or two will suffice to demonstrate this. For ankylostomes, the direct method revealed 72 positive out of the 910 (7·9 per cent.), Willis, 209 out of 884 (23·6), Faust, 46 out of 233 (19·7), the Charles and Barthélemy 2 out of 29. For *Trichuris*, the direct method revealed 344 positive among the 910 (37·8), Willis, 638 among 884 (72·1), Faust, 177 among the 233 (75·9) and the C. & B. 16 out of 29, or just over half.

For *Hymenolepis nana*, direct examination 9 out of the 910 (0·9). Willis 12 out of 884 (1·3), Faust 7 out of the 233 (3·0), C. & B. 0 out of the 29.

Summing up : 810 of the 910 recruits, that is males of 21 years of age, were parasitized with helminths (88 per cent.). Other analyses show the proportions among the various occupations, agricultural, fishing, industrial workers, those engaged in commerce and so on. *Ascaris lumbricoides* was found in 613 (67·3 per cent.), *Trichuris trichiura* in 676 (74·2) ; ankylostomes in 212 (23·2), *Hymenolepis nana* in 12 (1·3), *Strongyloides stercoralis* in 5 (0·5). *Enterobius vermicularis* was found in 20 and the ova in twelve. One species of parasite only was found in 246 (27·0), two in 401 (44·0), three in 149 (16·3) and four in 5 (0·5 per cent.). *H. Harold Scott*

Taylor, J. A. & Riddell, W. A. **Entozoa of Children in Two Regina Institutions.** *Canadian J. Pub. Health.* 1950, Nov., v. 41, No. 11, 471–5. [14 refs.]

The authors examined stools and anal swabs (NIH) from 60 children in two institutions in Regina, Saskatchewan. In institution A, 27 children aged 3 months to 6 years were examined : 33 children aged 3–16 years were examined in institution B.

The NIH swabs were taken between 7 and 9 a.m. ; in all, 5 were taken from each child on alternate days. Stool specimens were the first passed each morning and were also taken on 5 occasions on alternate days. The stools were examined by the Faust zinc oxide flotation method and by stained iodine preparations.

The results are shown separately for each institution and are summarized for the combined total. Of the 60 children, 42 had intestinal parasites : 12 were *Enterobius*, 26 *Giardia :* of the *Giardia* infections 19 of 26 were among the younger children, the remaining 7 being from the 33 children of older ages. No *E. histolytica* was found in any of the children.

Altogether 65 per cent. of the children showed parasites and the authors suggest reasons why the rate of infestation in the general population is likely to be higher.

A table shows that less than half of the positive results were obtained at the first examination, less than one-third at the second, and so on in diminishing proportions. The authors consider that at least 4 stool and 5 NIH swabs are necessary to ensure diagnosis and that they should be taken at intervals of 48 hours.

It is suggested that despite the high standards of sanitation maintained, many children are ingesting contaminated food : and they add that it is fortunate for residents of Canada that their country provides a poor climatic environment for many dangerous parasites. *H. J. O'D. Burke-Gaffney*

COSTA, B. Helmintoses. [**Helminthiasis (in Brazil).**] *Folha Med.* 1950, Nov. 25, v. 31, No. 22, 169–71.

The information in this short article is given in rather general terms. During periods ranging from one to four months in eleven States examinations were made to determine the degrees of helminthic infestation among the people ; nearly half a million examinations were carried out. *Ascaris*, *Enterobius* and *Taenia* are said to be " generally distributed in urban and rural districts " ; *Echinococcus* in cattle, sheep and pigs is common and human cases of hydatid occur.

In the 11 States, 611 localities gave positive cases of infestation by *Schistosoma mansoni* and in 381 of them the incidence was above 4 per cent. Altogether, 440,786 were examined and 44,477 (10·09 per cent.) were positive. The estimated population of each State is given and the " probable number of infested " is calculated on this 10 per cent. basis as 2,614,465. The percentage of infestation varied widely. In Sergipe there were 5,134 positive among 17,229 (29·8 per cent.), whereas Piauí had only 4 among 10,424 (0·04) ; Pernambuco 25 per cent. among 50,971, Minas Gerais only 4·9 per cent. among 162,491.

In another table of 10 States, 71,193 out of 77,406 examined were infested with worms of some kind (92 per cent.) and 59,966 (77 per cent.) had hookworms. *H. Harold Scott*

DE AZEVEDO, J. F. & COLAÇO, A. F. T. Sobre a morfologia do *Schistosoma haematobium* de Portugal. [**The Morphology of *Schistosoma haematobium* in Portugal.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 7–17, 11 figs. (9 on 5 pls.). English summary.

The authors have measured the ova and the adult worms, *S. haematobium*, in Portugal and find that they differ considerably from those who have studied the question in Egypt and in South Africa. First, the ova : In Egypt the average length ranged between 110 and 130 μ, the fertilized being 110–120 μ, the unfertilized 116–134 μ ; the average width was 46–50 μ in the case of the

fertilized and 43–46 μ for the unfertilized. In South Africa the average length was 100–153 μ (the fertilized might reach 171·4 μ) and breadth 40–46 μ as the average of 1,000 unselected ova, and 64·2–78·5 μ in the case of the fertilized ova. In Portugal, the average length was 125–145 μ and breadth 50–65 μ. It is only fair to add, however, that the variations were wide. On the whole the terminal spine was slightly shorter than in the Egyptian and South African ova.

Next, the adult worms. The authors were not able to obtain specimens from human sources and consequently used those from experimentally infected laboratory animals, in particular hamsters, *Cricetus auratus*, and macaques, *Cercopithecus sabaeus*, infected with miracidia from *Planorbis dufourii* themselves infected from human sources. [The use of experimental infections in animals may throw some doubt on the application of the measurements to human infections.] In hamsters the measurements of the female worms varied between 18 and 12·4 mm. in length and 0·318 and 0·27 mm. in thickness; in macaques, between 14·86 mm. long and 0·24 and 0·18 mm. broad—a variation between wide limits. In the case of male worms the hamster specimens ranged between 16·22 and 6·86 mm. in length and 0·66 and 0·34 mm. in breadth; those from the macaques between 9·94 and 4·59 mm. in length and 0·58 and 0·36 mm. in breadth. [It will be seen that in each case the length varied so much that the longest was more than twice that of the smallest from the same animal, but that the larger were those from the hamsters.] The period between infestation by cercariae and death was the same for each animal—four months when infestation was percutaneous, 10 months when by peritoneal inoculation.

H. Harold Scott

BARTONE, L. Sindrome emottoica da Bilharziosi polmonare. Considerazioni su un caso clinico osservato in Cirenaica. [**A Case of Schistosomiasis of the Lung with Haemoptysis.**] *Acta Med. Italica.* 1950, Oct., v. 5, No. 10, 341–4. English summary.

The patient was an Arab soldier born in Derna in 1905. In January 1940 he spent 5 days in Derna hospital with a bronchopneumonic condition which was accompanied with haemorrhagic sputum and from which he quickly recovered. The condition recurred 20 days later, but on this occasion it only lasted for a few hours and the man did not even have to go off work. On the 20th March, 1940, this man was admitted to hospital in Benghazi, complaining, for 2 days, of a sharp pain in an area corresponding to the base of the right lung extending towards the right nipple, with a history of rigor, dyspnoea, slight fever and some dry cough. Haemoptysis occurred in the early morning of the 22nd, and recurred several times during the following 24 hours, after which there was a rapid subsidence of all the signs and symptoms within the next 4 days. Sputum examinations failed to reveal *Myco. tuberculosis* or elastic fibres, but a specimen eventually showed ova of *Schistosoma haematobium* with their characteristic terminal spines. X-rays had only suggested some accentuation of the broncho-vascular network towards the right base. The differential blood-count gave an eosinophilia of 12 per cent. No evidence of the helminth was found either in the urine or by cystoscopy of the bladder.

The case was characterized by intense dyspnea, very little fever, a rapid course with apparent recovery within a few days and little change in the general state of health.

Schistosome infection is rare in Cyrenaica but the helminth is known to occur in Derna where both *Planorbis* and *Bulinus* have been collected. The patient is believed to have acquired the infection while wading in, or drinking, the water of the Wadi Derna, though no history of pruritus was obtainable.

Antimony treatment was followed by cure, and no evidence of persistence or recurrence was to be found when the patient was examined again two years later. *J. Cauchi*

LUCENA, D. T. Introdução no país de duas espécies Africanas de Caramujos transmissores de schistosomose : *Bulinus tropicus* (Krauss) e *Biomphalaria alexandrina pfeifferi* (Krauss). Nota preliminar. [**Introduction into Brazil of Two African Species of Molluscs which Transmit Schistosomiasis :** *B. tropicus* **and** *B. alexandrina pfeifferi*.] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, July, v. 2, No. 3, 278.

SCHUBERT, M. **Effect of feeding Antimony Compounds to Mice experimentally infected with** *Schistosoma mansoni*. *Amer. J. Trop. Med.* 1950, July, v. 30, No. 4, 525–32.

In work on the chemotherapy of experimental schistosomiasis by the author and his colleagues already reported [this *Bulletin*, 1948, v. 45, 620, 621 ; 1949, v. 46, 646] only two compounds were found to be of promise when administered orally. These were butyl antimonyl gallate and phenyl mercuric gluconate. Investigations in this field are now to be discontinued in the author's laboratory, and the present report therefore represents his concluding observations on the subject.

The methods used were similar to those reported in the earlier communications. Of 11 antimonials tested (formulae of which are given), at least 3 were capable of eliminating the infection. One of these three has not yet been described elsewhere and its formula is given as $Sb[SC(NH_2)_2]_3[C_6H_4O_2]Cl$.

The author also reports the results of intraperitoneal treatment with 4 antimonials other than those mentioned above. Also it is mentioned, and recommended for further investigation, that the efficacy of one compound, antimony tri(dodecylmercaptide), was found to be enhanced if given simultaneously with BAL.

Several of these antimonials were tested against the infection in golden hamsters and were found to be more effective in these animals than in mice.

E. M. Lourie

AUGUSTINE, D. L. & ISENBERG, H. J. **Clonorchiasis in Caucasians living in Greater Boston.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 871–2.

The authors refer to the occurrence of clonorchiasis in four Caucasians living in New York City, reported by EDELMAN and SPINGARN [this *Bulletin*, 1950, v. 47, 56] and now report three additional cases seen by themselves in less than a year among Caucasians living in greater Boston.

The patients came from the same group of 20,000 displaced persons from Shanghai as the cases referred to above. They were males aged 37, 40 and 46 years of German origin. No specific symptoms were noted and diagnosis was made by finding eggs of *Clonorchis sinensis* in the stools. Reference is made also to the report on this group by KOENIGSTEIN [this *Bulletin*, 1949, v. 46, 648] and the association of the infection with " pickled herring ".

The present authors point out that as the original colony was dispersed after the war and many of the members are now probably living in the United States, the disease should be looked for, especially in the hospitals of large cities. They draw attention to an editorial in *Trop. Med. News*, 1949, v. 6, No. 5, 17, which refers to the probability of *Bulinus* [*Bithynia*] *tentaculatus* transmitting

clonorchiasis in the United States. " This snail is said to have been introduced from Europe and to be very common in the Great Lakes Region."

The possibility of clonorchiasis becoming endemic in the United States, though remote, should not be ignored. *H. J. O'D. Burke-Gaffney*

RAMAGE, J. S. **Liver Fluke removed from the Human Common Bile-Duct.** *Lancet.* 1951, Jan. 20, 146.

The author reports a case of liver-fluke removed at operation from the common bile-duct of a farmer's wife in a country district in North Staffordshire. Since 1947 the patient had had abdominal pain : she was diagnosed as subacute cholecystitis and a cholecystectomy was performed. The gallbladder was packed with stones. The common bile duct was somewhat dilated and was found, on incision, to contain an adult *Fasciola hepatica.* There was no eosinophilia. The patient made an excellent recovery.

Figures from the local abattoir showed that during the year 1,542 of 5,857 (26·3 per cent.) livers of cattle and sheep examined were shown to be affected wholly or partly by liver-flukes. In view of this high figure, the finding of a human case is not surprising, but it appears to be the first recorded from North Staffordshire.

[The author refers to the case reported by MANSON-BAHR and WALTON (this *Bulletin,* 1941, v. 38, 382) and claims that his own seems to be the second recorded. In a footnote, however, he adds that since his own note was submitted for publication " a further case " has been published by MURPHY and PASCALL, *Brit. Med. J.* 1950, Mar. 18, 647. Reference to the latter paper will show, however [this *Bulletin,* 1950, v. 47, 555], that these authors recorded 3 cases (two in Bath and one in Plymouth) : and that they refer to another, that of O'DONNELL, also in the West of England. The present author's case would therefore be the sixth reported, at any rate in Britain.]

H. J. O'D. Burke-Gaffney

GAJARDO TOBAR, R., APABLAZA, H., URIBE, P., BENAVIDES, I., VARGAS, A., CEPEDA, C., ROJAS, E., ZELDIS, A., LUCCHINI, A. & DE LA FUENTE, J., Nuevos casos de distomatosis hepatica producidos por *Fasciola hepatica.* Estudio epidemiológico, clínico y anátomo patológico. [**More Cases of Infestation by *Fasciola hepatica* (in Chile). Epidemiological, Clinical and Pathological Study.**] *Hospital de Viña del Mar.* Chile. 1950, Oct., v. 6, No. 4, 71–121, 14 figs. & 1 chart. English summary.

The chief interest of this article, at least for readers of this *Bulletin,* lies in the epidemiological section. The clinical and pathological aspects are well described, with illustrative cases and reproductions of photomicrographs of the lesions produced, but these are matters of general knowledge and contain nothing new.

Fascioliasis is common among animals brought to the slaughter-houses of Valparaiso. Figures are given for the twenty-year period, 1930–49 inclusive, for cattle, goats and sheep, and pigs. For cattle the percentage infested varied between 5·41 in 1931 among 37,828 animals and 42·04 among 32,440 in 1938. In 1949 the percentage was 35·5, the highest within a decade. Among goats and sheep [which are not separated] the percentage ranged from 1·67 among 83,191 in 1947 and 19·58 among 79,736 in 1936. In 1949 it was 8·4 among 68,488, the highest for six years. Among pigs the lowest was 6·48 among 9,527 slaughtered in 1934 and 34·56 among 11,228 in 1938 ; in 1949, the latest recorded, it was 19·2 per cent. among 16,575 the highest for ten years, with one exception (19·52 in 1947).

The infestation rate was much higher in Chile than in the Argentine cattle. In the early part of January 1950 the Argentine percentage was 18·9 to 21·7, the Chilean figures 40·8 to 58·8. The snail vector is *Limnaea viator* d'Orbigny.

The symptoms of the different stages of the disease in man are fully described and the complications, but no figures are given to indicate the prevalence in man. *H. Harold Scott*

Basnuevo, J. G. & Seuc-Chiu, A. *Fasciolopsis buski* en Cuba. (Dos casos tratados con Cloroquina, Violeta de genciana, Hexilresorcinol y Tetracloroetileno). [*Fasciolopsis buski* **in Cuba. (Two Cases treated with Chloroquine, Gentian Violet, Hexylresorcinol and Tetrachlorethylene.)**] *Rev. Kuba Med. Trop. y Parasit.* 1950, July–Aug., v. 6, Nos. 7/8, 91–5, 6 figs. [12 refs.]

The English summary appended to the paper is as follows :—

" The authors report the presence of Fasciolopsis buski in Cuba in two young Chinese from Canton, China, which arrived recently.

" The first of these cases was cured with a mixture of Hexylresorcinol and Tetrachlorethylene administered by the Lyon tube.

" Case No. 2 was cured with Gentian violet administered orally, 0·09 Gm. daily during thirty (30) days. The patient was also given 0·50 Gm. of Chloroquine orally, daily, during 30 days, together with the Gentian violet."

Rodriguez M., J. D., Gomez Lince, L. F. & Montalvan C., J. A. El *Opisthorchis guayaquilensis*. (Una nueva especie de *Opisthorchis* encontrada en el Ecuador.) [*Opisthorchis guayaquilensis* **a New Species encountered in Ecuador.**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1949, Jan.–Dec., v. 6, Nos. 1/4, 11–24, 10 figs.

The English summary appended to the paper is as follows :—

" An investigation is reported which was carried on with the purpose of identifying an unknown parasite (Or. Trematode) whose eggs were found during a routine stool examination in The National Institute of Health Leopoldo Izquieta Perez of Guayaquil, Ecuador.

" Epidemiological and parasitological research demonstrated the presence of an infected focus with the unknown parasite in the Parroquia Pedro Pablo Gomez, a rural small town in the Province of Manabi. Dogs of that area were examined and eggs were found in their stools and adult worms in the biliary ducts.

" Morphological characters of the fluke are described and the authors think that because of those characters, it deserves to be considered as a new species of the genus *Opisthorchis*. The name *O. Guayaquilensis* is proposed to honor the City of Guayaquil place where all the investigations were conducted and the seat of The N.I. of H.

" This is the first *Opisthorchis* focus described for Ecuador and perhaps for the Western Hemisphere, where only sporadic cases have been described in immigrants. Attention is called to the great importance of this fact."

Hümes, A. G. **Experimental Copepod Hosts of the Broad Tapeworm of Man,** *Dibothriocephalus latus* (L.). *J. Parasitology*. 1950, Dec., v. 36, No. 6, Sect. 1, 541–7. [16 refs.]

" 1. *Diaptomus piscinae* Forbes, *D. sanguineus* Forbes, *D. mississippiensis* Marsh, and *D. albuquerquensis* Herrick have been experimentally infected with coracidia of *Dibothriocephalus latus*. Procercoids developed to the fully formed

condition in the first three species, and early development occurred readily in the fourth. This brings to 10 the number of species of *Diaptomus* known to serve as experimental first intermediate hosts of *D. latus*.

"2. Procercoids developed readily also in the euryhaline copepod *Eurytemora affinis* after experimental infection.

"3. *Cyclops ater* Herrick, *C. fuscus* (Jurine), *C. bicuspidatus thomasi* Forbes, *Canthocamptus staphylinoides* Pearse, *Osphranticum labronectum* Forbes, and *Diaptomus birgei* Marsh failed to develop procercoids after exposure to coracidia.

"4. A somewhat heavier infection occurred in copepodid stage V of *Diaptomus sanguineus* Forbes than in the adults of this species.

"5. No significant difference in number infected or degree of infection was observed in the two sexes of infected *Diaptomus*.

"6. No apparent differences in the rate of development of the procercoids were observed in the two sexes or in the mature or copepodid stage V instars.

"7. Development of the procercoids occurs readily in most of the species of the genus *Diaptomus* thus far investigated. Procercoids develop to a lesser degree or not at all in species of the genus Cyclops. Presumably *Diaptomus* is a potential natural host of primary importance, while *Cyclops* is a potential natural host of secondary importance."

UPTON, A. C. **Taenial Proglottides in the Appendix : Possible Association with Appendicitis. Report of Cases.** *Amer. J. Clin. Path.* 1950, Dec., v. 20, No. 12, 1117–20, 3 figs. [21 refs.]

The author refers briefly to the literature of tapeworms associated with appendicitis and reviews the published cases. He also presents 4 hitherto unreported cases, bringing the total number found in the literature to 51.

The four cases were collected from records of 80,000 appendices examined in the Department of Pathology of the University of Michigan between 1895 and 1950. Brief notes are given in each case, in so far as they are available. In three of the cases, gravid taenial proglottides and scattered ova were found in the lumen of the appendix and in one of them, *T. saginata* was subsequently passed in the faeces. In the fourth case, ova only were found in the lumen but after a vermifuge the patient passed a *T. solium*.

The aetiology of appendicitis and the possible rôle played by tapeworms is discussed. It is concluded that the significance of taenial infection in this aetiology is obscure, but the worm is probably a predisposing factor in inflammation. The association is rare, even where taeniasis is endemic.

The paper is illustrated with 3 photomicrographs showing taenial proglottides and ova in the lumen of the appendix. *H. J. O'D. Burke-Gaffney*

CHANDLER, Asa C., READ, C. P. & NICHOLAS, H. O. **Observations on certain Phases of Nutrition and Host-Parasite Relations of** *Hymenolepis diminuta* **in White Rats.** *J. Parasitology*. 1950, Dec., v. 36, No. 6, Sect. 1, 523–35. [26 refs.]

ROYER, P. Un cas de kyste à échinocoques chez un indigène du Katanga. [**Echinococcus Cyst in an African in Katanga.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 663–5.

GAJARDO TOBAR, R. Epidemiología de la hidatidosis en Valparaíso y Aconcagua. [**Epidemiology of Hydatid Infestation in Valparaiso and Aconcagua.**] 16 pp. [11 refs.] [Hospital de Viña del Mar, Chile. No date.]

In the hospitals of the 22 provinces of Chile there were 273 cases of hydatid disease in 1941 and 131 in 1942. Valparaiso had 18 and 3 in these two years

respectively and Aconcagua 3 and none. Santiago contributed most, 100 in 1941 and 49 in 1942.

The author compares the Chilean figures among a population of 5½ million with those of the U.S.A., no cases among a population of 140 million, of Australia 266 and 440 in the two years respectively among 7,306,637, and the Argentine 221 among 12 million.

The author bases his further study on 118 cases which have come to light in Valparaiso and Aconcagua in the ten years ending 1948 [but his detailed table totals 82 from Valparaiso and 20 from Aconcagua]. The sex and ages of 111 are given ; 62 were males, 49 were females ; 25 were in the third decade, 19 in each of the fourth and fifth decades. The liver was involved in 66 (55·9 per cent.), the lungs in 37 (31·35), the kidneys in 3·46 and the brain in 2·54 per cent.

In the slaughter-houses the percentage infected varied : among cattle between 3·91 per cent. of 46,795 slaughtered in 1946 and 37·27 among 41,403 in 1934 ; in 1947—the latest figures given—5·01 among 44,117. Of goats and sheep, the figures ranged between 0·82 per cent. of 98,456 in 1945 and 23·93 among 108,327 in 1933, the latest figure (for 1947) being 1·07 among 83,191. Fewer pigs are slaughtered but the infestation rates were higher, ranging between 6·85 among 11,491 in 1931 and 25·86 among 8,236 in 1935, the 1947 figures being 15·53 per cent. among 14,746. *H. Harold Scott*

Nogueira, J. F. P. & Coito, A. de M. F. Sobre a ancilostomíase autoctona na Ilha Brava—Arquipélago de Cabo Verde. [**Ankylostomiasis in the Isle of Brava, Cape Verde Islands.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 253–81, 5 graphs, 6 figs. & 1 map. English summary.

Working in the island of Santo Antão in 1948 the authors examined 2,065 specimens of faeces and found only a single case of hookworm infestation, 5 females and 1 male *Necator americanus* in a boy of 11 years who had lived in Brava Island. They went to the latter place and in the two months, December 1948 February 1949, examined the faeces of 1,222 persons between the ages of 3 months and 72 years. They found 1,135, or 92·9 per cent., infected with some parasite. Many had multiple infections, two had six. The chief helminth was *Trichuris trichiura*, 936 (76·6 per cent.) ; next came *Ascaris lumbricoides*, 869 (71·1) ; hookworm was third, 462 (37·8). *Entamoeba histolytica* was the commonest protozoal parasite, 224 (18·3). Males and females were almost equally infested with hookworms, 236 males, 226 females. The degree of infection was of the mildest. Of 81 treated with carbon tetrachloride 66 passed the worms and 47 of these passed less than 10, and 11 others between 10 and 20. Also, of 163 specially examined 81 (50 per cent.) passed less than 500 ova per gramme of faeces.

Illustrations show the dilapidated and primitive conditions of the latrines, and tables give the rainfall in different parts of the island month by month for the 7 years 1942–1948 inclusive and the relative humidity in Furna and Nova Sintra. Some of the inhabitants complain of itching of the feet and ankles followed by pustules—the condition is known locally as *Pé lama* (mud-foot)—due probably to penetration of the larvae, for all so affected were harbouring hookworms. *H. Harold Scott*

Meira, J. A. & Galvão, A. L. A. Considerações sôbre a fase larvária da infecção ancilostomótica. Sôbre dois casos clinicos de ancilostomiase aguda. [**Observations on the Larval Stage of Hookworm Infection. Two Clinical Cases of Acute Ankylostomiasis.**] *Arquivos Facul. de Hig. e Saude Pública Univ. de São Paulo.* 1949, June, v. 3, No. 1, 29–52. [19 refs.] English summary.

Benetazzo, B. & Zama, F. Sulle reazioni immuno-allergiche nell'ascaridiosi umana. [**The Reactions of Allergy and of Immunity in Human Ascariasis.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Sept., v. 31, No. 9, 655–70. [26 refs.]

Using alcoholic and aqueous extracts made from the roundworm *Parascaris equorum*, which infests horses, the authors have investigated the intradermal, precipitation and fixation reactions of these antigens with the skin and blood serum of 43 human subjects, aged from 8 to 45 years. These were selected from the in-patients and out-patients of the Tropical Diseases Hospital in Rome. The series included :—

i. Eleven cases of *Ascaris* infestation which could be demonstrated by examination of the faeces ;

ii. A person known to have had *Ascaris* 5 months before but showing no evidence of the infestation since ;

iii. Two cases of mixed infection, one having both *Ascaris* and *Trichuris*, the other harbouring *Hymenolepis nana*, *Enterobius*, *Ascaris* and *Trichuris* ;

iv. Three hosts of *Taenia saginata* ;

v. Three hosts of *Enterobius* ;

vi. Three hosts of *Trichuris* ; and

vii. Twenty patients in whom neither the examination of the faeces nor X-ray examination of the bowel showed any evidence of worm infestation.

In every case, a blood specimen was taken first thing in the morning, after the night's fast, and the intradermal test was applied immediately after. The latter test gave a positive reaction in every case of known *Ascaris* infestation, including the one where evidence of this infestation had become absent five months before. Two of the 3 cases of *Taenia* proved positive to the test, which was found negative in the cases of *Enterobius*. Of the 3 cases of *Trichuris*, 1 was strongly positive, the other 2 being negative. Among the 20 control cases, 4 (20 per cent.) gave a positive reaction. The authors conclude that the host of *Ascaris* is sensitized against the protein and other products of the worm, that this allergic sensitivity may linger for some time after the worms have been expelled, but that one is left in some doubt as to how far this reaction is specific.

The results of the serological tests proved inconclusive. *J. Cauchi*

Capponi, M. La filariose en Indochine. [**Filariasis in Indo-China.**] *Méd. Trop.* Marseilles. 1949, May–June, v. 9, No. 3, 442–6. [14 refs.]

This is a discussion on filariasis in French Indo-China, and contains only a few new observations.

Filariasis has been known to occur in Indo-China for a long time ; it has been concluded that all the microfilariae observed were those of *Wuchereria bancrofti* but in 1936 Galliard described the finding of *W. malayi* in Indo-China [this *Bulletin*, 1937, v. 34, 891]. *W. malayi* has not hitherto been found in Southern Indo-China ; the author reports the finding of this parasite in South Annam and in Cochin China.

The incidence of microfilariae in the Red River delta has been found to be about 5 per cent. In Southern Indo-China microfilariae are not so frequently found ; in a series of 20,000 thick drops examined for malaria parasites only 2 were reported as showing microfilariae, and in another series of 5,000 not a single microfilaria was found. However, in 363 blood samples from the province of Thu-Dan-Mot, microfilariae were found in 7.

Pathological lesions due to filariasis are not as common in Indo-China as in Africa. HUARD (*Rev. méd. française d'Extrême Orient*, 1942 v. 20, 891) reported 40 cases of intra-scrotal lesions in Tonking. Chyluria associated with filariasis does occur, but is uncommon, as also is elephantiasis, in Indo-China.

The author enumerates the differential points between the microfilariae of *W. malayi* and *W. bancrofti*, respectively ; these are the generally accepted ones. He records finding microfilariae with the characteristics of *W. malayi* in the blood of "*Stiengs des Terres Rouges*" [from the context this would appear to refer to a tribe]. They were fairly numerous ; 8 were found on one slide. They measured 240 to 248 μ by 5 μ.

[*Wuchereria malayi* is referred to throughout as *Microfilaria malayi*, and it is stated that the adult of *W. malayi* has not yet been found : but see this *Bulletin*, 1941, v. 38, 152.] *L. E. Napier*

BACKHOUSE, T. C. & HEYDON, G. A. M. **Filariasis in Melanesia : Observations at Rabaul relating to Incidence and Vectors.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Dec., v. 44, No. 3, 291–306, 2 figs. [21 refs.]

The observations recorded in this paper were made independently by the authors between the years 1930 and 1935. The estimations of the proportions of persons in different areas harbouring microfilariae of *W. bancrofti* in the peripheral blood were based on the examination of 20 cm. of blood taken between the hours of 9 and 10 p.m., and yielded the following results :

427 adult males from various districts of New Guinea and adjacent islands	19·4 per cent. positive
131 adults, both sexes, Makada Island	35·1 „ „ „
188 adults, both sexes, Matty Island	32·9 „ „ „

Of the 427 adults comprising the New Guinea group three suffered from elephantiasis and one of them showed the presence of microfilariae. Among 390 persons in whom the epitrochlear glands were palpated, 116 (29·7 per cent.) showed enlargements. If this enlargement is accepted as evidence of filariasis, then the total infection rate for the group is about 40 per cent.

Makada Island and Matty Island are widely separated, but no great difference in the filarial situations, as observed in the human host, were noted ; the proportion of persons harbouring demonstrable microfilariae in their peripheral blood increased with age and seemed to be unaffected, except in a single doubtful instance, by sex.

The authors state that a suggestion has crept into the literature that a non-periodic form of filariasis exists in New Guinea. This they attribute to the misinterpretation by a number of writers of a statement originally made by FÜLLEBORN in 1911 [and see also this *Bulletin*, 1912, v. 1, 86], and they produce evidence to show that the periodicity of microfilariae of *W. bancrofti* in the New Guinea area is quite clearly nocturnal.

The authors consider anophelines, particularly *Anopheles punctulatus farauti* to be the chief vectors of *W. bancrofti* in Melanesia. This opinion is founded on the results obtained from a limited number of infection experiments with bred *A. p. farauti* and *A. p. punctulatus* (of eight mosquitoes fed two subsequently showed the presence of infective forms), and as the result of dissecting 52 wild-caught *A. p. farauti* and *A. p. punctulatus* ; 12 of these mosquitoes showed the presence of developing larvae indistinguishable from those of *W. bancrofti* and in five of these mosquitoes the larvae had reached the infective stage. Feeding experiments carried out with *A. annulipes*, the commonest anopheline in the

southern states of Australia, showed that the species was a good experimental host of *W. bancrofti*. *Aëdes pseudoscutellaris* was shown experimentally to be inhospitable to *W. bancrofti* in the Rabaul region. *R. M. Gordon*

VAN DER KUYP, E. *Mansonella ozzardi* **and** *Dipetalonema* (*Acanthocheilonema*) *perstans* **in American Indians in Surinam (Dutch Guiana).** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1950, Dec., v. 2, No. 4, 357–8.

"*M. ozzardi* and *D. perstans* are found in American Indians in the Savannah belt in Surinam. *M. ozzardi* is very rarely reported in mulattoes."

HARTZ, P. H. **Does Onchocerciasis occur in Surinam ?** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1950, Dec., v. 2, No. 4, 355–6.

"A small cutaneous tumour removed from the breast of a 58-year old woman who had never lived outside Surinam was found to consist of granulation tissue containing three worms, belonging to the *Filarioideae*. Two of the worms were almost completely necrotic and contained numerous microfilariae. A few intact microfilariae were found in the granulation tissue. Although it was not possible to determine the worms with certainty, the diagnosis *onchocerciasis* had to be considered.

"The desirability of a systematic investigation of the eventual occurrence of onchocerciasis in Surinam is stressed, especially since the disease also occurs in Eastern Venezuela."

RODRIGUEZ M., J. D., VILLAMIZAR, L. & RIOS, T. La enterobiasis en Guayaquil. Revisión de conocimientos anteriores. [**Enterobiasis in Guayaquil.**] *Rev. Ecuatoriana de Hig. y Med. Trop.* 1949, Jan.–Dec., v. 6, Nos. 1 /4, 39–48.

The following is a translation of the authors' summary :—

Graham's technique was used to study *Enterobius vermicularis*, as it was considered simpler and more practical than using Hall's method.

Examinations were made of 100 children, boys and girls, who attended the Alejandro Mann Hospital.

The total incidence of infection was 18 per cent., and was higher in boys than in girls.

To obtain exact infection rates, repeated examination over 6 or 7 days would be necessary. *H. J. O'D. Burke-Gaffney*

NOUR EL-DIN, G. **Phenothiazine in Enterobius Infection of Man.** *Medicine & Laboratory Progress*. Cairo. 1950, Feb., v. 11, No. 2, 41–6. [14 refs.]

SANDOSHAM, A. A. **On** *Enterobius vermicularis* **(Linnaeus, 1758) and some Related Species from Primates and Rodents.** *J. Helminthology*. 1950, v. 24, No. 4, 171–204, 8 figs. [29 refs.]

This study of collections of *Enterobius* spp. from a variety of mammalian hosts contains much new information concerning this group of parasites and includes descriptions of four new species, the erection of a new genus containing a new species, several new host records and re-descriptions of little known species. The genus *Enterobius* is split into two new subgenera, which are characterized respectively by the presence or absence of a tail spike in the male

and are also distinctive in their host distribution, *viz.*, New World and Old World Primates respectively.

Previous records of the occurrence of *E. vermicularis* in non-human hosts are somewhat doubtful but it is recorded authentically here from no less than three different kinds of Primates : the Chimpanzee (*Anthropopithecus troglodytes*), the Lar Gibbon (*Hylobates lar*) and the Lion Marmoset (*Leontocebus rosalia*). The material was obtained from animals which had been in the London Zoological Gardens for varying periods and is described in detail. The public health significance of these reservoir hosts is discussed briefly and their value as experimental animals for research on the life-cycle of *E. vermicularis* is indicated. Observations on the male tail of this species confirmed the presence of six pairs of caudal papillae in most of the specimens examined and it is emphasized that unless a suitable mounting technique is used the sixth or laterally placed pair of papillae may be easily overlooked. *J. J. C. Buckley*

Surewicz, W. Próba leczenia fuadyną wlośnicy doświadczalnej u świnek morskich. [**A Test Treatment of Experimental Trichinosis in Guineapigs by means of Fouadin.**] *Przeglad Epidemiol.* Warsaw. 1949, v. 3, Nos. 3/4, 477–93, 20 charts. [14 refs.]

The English summary appended to the paper is as follows :—

" The author begins by describing the published results of the treatment of *trichinosis* by means of fuadin and presents afterwards the results of his own experiences and observations of the treatment applied by means of fuadin to guinea-pigs infected by *trichinosis*.

" The experiments were done on 20 guinea-pigs each of which had been infected by 1800 fresh *Trichina spiralis* introduced by a sound into the stomach of the animals.

" The guinea-pigs were divided into 3 groups : one of which was treated by fuadin since the seventh day of infection, the second since the 14th day of infection and the third was not treated at all.

" During the observations the temperature of the body was taken twice a day.

" After 28 days since the date of the infection the guinea-pigs were killed.

" In the muscles of all the guinea-pigs treated as well as not treated by fuadin *Trichina spiralis* were found ; the quantity of trichina in the muscles sections equally weighed out was compared.

" The time of fuadin treatment did not influence the number of the trichina placed in the muscles.

" On the basis of the observations of the guinea-pigs and of the experiment results the author considers that the fuadin does not interrupt the cycle of trichina development in guinea-pigs and therefore does not possess any means of curing *trichinosis*."

Riedel, B. B. **Sulfonamide Therapy of Trichinized White Mice.** *J. Parasitology.* 1950, Dec., v. 36, No. 6, Sect. 1, 582–5. [11 refs.]

" An investigation was performed on several groups of trichinized mice. The results showed that continuous feeding of 0·25 percent of sulfaquinoxaline did not effect a larval reduction. A 2·0 percent sulfanilamide feed effected a larval reduction of 57·7 and 50·4 percent, while 1·5 percent of sulfamerazine was 52·4 and 59·3 percent effective. Combinations of sulfanilamide and sulfamerazine reduced the larval counts 67·1 and 79·9 percent.

" Among the control mice infected with a lethal dose of larvae, 11·1 percent survived the 50-day, experimental period. Sulfanilamide and sulfamerazine effected a survival of 62·1 and 71·1 percent respectively. The rate of mortality was reduced to 17·8 percent by a combination of sulfanilamide and sulfamerazine. The period of mortality was distinctly shortened among the sulfonamide groups of mice."

DEFICIENCY DISEASES

Conférence Interafricaine sur l'Alimentation et la Nutrition, Dschang—Cameroun, 3–9 octobre 1949. [**Inter-African Conference on Food and Nutrition, Cameroons, 1949.**] 537 pp., 8 figs. on 4 pls., 12 figs. (1 map) & 3 charts. Édité par la " Documentation française ".

The inter-African Conference on Food and Nutrition took place at Dschang, in the French Cameroons, in October, 1949. Delegates attended from the United Kingdom, France and Belgium, and their respective African territories, and from the Union of South Africa and Portugal. Observers were present from the Food and Agriculture Organization of the United Nations and from the World Health Organization.

The object of the Conference was to consider the problems of food and nutrition in the various countries of Africa ; these problems were approached from many different aspects including geographical, agricultural, economic, racial, sociological and medical. Each participating territory submitted to the Conference a report on its own nutritional conditions, and these are reproduced (in English and French) in the present account. The main headings under which the problems were considered and upon which resolutions were formulated were :—

1. Dietary requirements and the study of nutrition.
2. The need for more extensive study of the problems of diet and nutrition.
3. Nutritive values of foods and tables of food composition.
4. The feeding of vulnerable groups.
5. The feeding of workers.
6. Increase of food production.
7. Food preservation and storage.
8. The hungry season.
9. Regions where malnutrition is especially serious.
10. Demonstration areas.
11. Education of the public in nutritional matters.
12. The establishment of local nutrition organizations and of an Inter-African Information Bureau on Food and Nutrition.

The resolutions of the Conference were mainly at a general policy level and recommended the desirable steps to be taken by the constituent territories. It was decided that a future conference should be organized within the next three years to review the practical results achieved on the basis of the present recommendations and to examine certain special well-defined problems at an expert, technical level.

The Proceedings of the Conference are admirably set out and documented and include a comprehensive bibliography on diet and nutrition in Africa which will be of great value to workers in that continent. *Dean A. Smith*

SMITH, Dean A. **Report of a Nutrition and Health Survey in the Kawambwa District.** 27 pp., 1 chart & 1 map. 1950. Lusaka, Northern Rhodesia : Govt. Printer.

This survey was carried out in the Luapula Valley and plateau in Northern Rhodesia. In the Valley the total calorie intake was probably sufficient at all seasons of the year. There was some evidence of total protein insufficiency, but intake of calcium and iron appeared adequate. There were signs of marked deficiency of both the B complex of vitamins and of vitamin C. On the plateau, the total food supply was insufficient during the hungry season and there was a considerable degree of protein deficiency. The intakes of the B complex and of vitamin C were greater than in the Valley. Infection with malaria, hookworm disease and, in some places, schistosomiasis, was heavy and seriously impaired nutritional health.

This survey contains many practical suggestions for the health department, for agriculture, for new methods of education and for economic development : it should be widely read in the Rhodesias. The survey is indeed a model of the type of expert information and advice that a nutritionist can give to the government of a backward agricultural district in the tropics. As such it will be of interest to those about to undertake similar surveys in other parts of the world. *R. Passmore*

BOUQUET, A. & KERHARO, J. Les végétaux condiments de l'Afrique du Nord dans l'alimentation, la thérapeutique et la magie. [**Vegetable Relishes of North Africa in Nutrition, Therapeutics and Witchcraft.**] *Acta Tropica.* Basle. 1950, v. 7, Nos. 3 & 4, 237–74 ; 315–56.

ASENJO, C. F., with co-operation of O. DE BORINQUEN SEGUNDO, Ana I. MUÑIZ & Aida M. CANALS. **Niacin Content of Tropical Foods.** *Food Research.* Champaign, Ill. 1950, Nov.–Dec., v. 15, No. 6, 465–70.

CORKILL, N. L. **Diet Protein in relation to Disturbed Host-Parasite Balance.** *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 212–21. [52 refs.]

It is well recognized that in a number of diseases such as kala azar, malaria, trypanosomiasis, amoebic dysentery and pulmonary tuberculosis in which periods of latency exist, there may be breakdown of resistance or disturbance of host-parasite balance, leading to relapse or exacerbation in response to a variety of stress conditions. Such stresses are trauma, intercurrent infection, malnutrition and such physiological stresses as pregnancy. The author puts forward the hypothesis that an important factor in this lowered resistance is failure of the host to synthesize antibody gamma-globulin under stress conditions in which there is excessive breakdown of tissue protein or insufficient intake of dietary essential amino-acids. The literature is reviewed and discussed with special reference to the albumin-globulin ratio in such stress states, and the influence of the amino-acid pattern of tropical staple cereals.

Dean A. Smith

CORKILL, N. L., CREDITOR, H. & STEWART, G. E. S. **The Significance of Pyralgia and certain Signs in Africans.** *J. Trop. Med. & Hyg.* 1950, Oct. & Nov., v. 53, Nos. 10 & 11, 201–8 ; 215–26, 3 figs. & 1 graph. [27 refs.]

In this paper, the authors have gathered together their accumulated records of clinical surveys carried out in the countries of the Middle East, mainly in the Sudan, during the period 1933 to 1948. [These surveys have been reported in this *Bulletin.*] On the basis of their inter-relationship with such dietary

surveys as have been done and with therapeutic trials, the possible aetiological significance of a number of common signs of nutritional ill-health is discussed. These signs are pyralgia—a burning pain in the extremities—follicular hyperkeratosis, conjunctival hyperkeratosis, mosaic skin, cheilosis, dyssebacia, discoloration of the buccal mucosa, and buccal frieze.

These manifestations are considered to represent a state of chronic malnutrition in areas where there are seasonal deficiencies of riboflavin, animal protein and vitamins A and C, and where there is dependence upon a single staple cereal. A deficiency of ascorbic acid—seasonal or perennial—is considered to be of basic importance in the hot, arid tropics and possibly to give rise to secondary deficiencies by causing achlorhydria. Of the individual manifestations, pyralgia is thought to be due to thiamine deficiency ; follicular and conjunctival hyperkeratosis to be associated with a joint deficiency of vitamins A and C ; mosaic skin to nicotinic acid deficiency ; cheilosis and dyssebacia to associated riboflavin and ascorbic acid deficiency ; and buccal pigmentation to severe ascorbic acid deficiency in which irreversible change causes the lesion to persist even after the deficiency has disappeared. [The " pyralgia " of these authors appears to be identical with, or similar to, the melalgia or " burning feet " syndrome described frequently, particularly in the Far East. About this latter syndrome a considerable literature has accumulated, and there is some evidence of both the site of the lesion and the causative deficiency. The work done on the syndrome in Asia may throw some light on the problem as it appears in the Middle East.] *Dean A. Smith*

KUNG, Lan-chen & HSU, Peng-cheng. **Nutritional Findings in Chinese School Children. Plasma Ascorbic Acid, Hemoglobin, and Total Serum Protein.** *J. Amer. Dietetic Ass.* 1951, Jan., v. 27, No. 1, 36–8. [12 refs.]

" Two hundred sixty-three school children in the suburbs of Peking were examined for the plasma ascorbic acid level in the winter of 1946, and the average value was found to be 0·16 mg. per 100 ml. The ascorbic acid level in the plasma tended to decrease as the length of time of deprivation of freshly harvested vegetables increased.

" Saturation tests by the method of Harris and Abbasy on a selected group of children substantiated the blood findings ; subjects with plasma ascorbic acid levels of 0·30 mg. per 100 ml. or above were likely to respond satisfactorily to the saturation test.

" The average hemoglobin level for boys was 11·1 gm. per 100 ml. and for girls 10·8 gm. per 100 ml. Both figures were lower than western standards.

" The average serum protein value of the school children was 7·3 gm. per 100 ml., which may be considered as normal."

TAKEDA, S. **On the Pathogenesis of Beriberi Heart, especially in relation to Allergy.** *Acta Scholae Med. Univ. in Kioto.* 1950, v. 27, No. 3, 231–40, 2 figs. on pl. [16 refs.]

At autopsy of the hearts of 74 cases of beriberi in a Japanese Institute, " rheumatic knots " were found in 40 per cent. The lesions were mainly around and adjacent to blood vessels in the interstitium and consisted of basophil mononuclear cells in a coagulum of fibrin. Cellular infiltrations were found in the pericardium and endocardium in some cases, and there was oedema and some mild fibrinoid degeneration in the muscle. The extent of the lesions was proportional to the severity of the clinical cardiac disorder and to the degree of right ventricular dilatation. The author regards these findings as proof of the allergic basis of beriberi heart-failure.

[The pathogenesis of beriberi in general and of the beriberi heart in particular are discussed at length. The English in which this discussion is couched is so unusual that the arguments are extremely difficult to follow.]

Dean A. Smith

TORII, S. **On the Pathogenesis of Beriberi-nephritis investigated from the Standpoint of Allergy. 1st Report. Studies about the Human Kidney.** *Acta Scholae Med. Univ. in Kioto.* 1950, v. 28, No. 1, 28–38, 6 figs. on pl. [51 refs.]

Glomerulonephritis was demonstrated in the majority of 67 cases of beriberi that came to autopsy in a Japanese Institute. There were changes in the glomeruli, tubules, vessels and interstitial tissue, the most constant being fibrinoid swelling of the tufts and proliferation of their cells. The lesions are described in detail and illustrated with good photomicrographs. The glomerulonephritis is regarded as allergic and, though the main attribution of beriberi to vitamin B_1 deficiency is not disputed, the suggestion is put forward that allergy is an important factor in the pathogenesis of the disease. *Dean A. Smith*

CRUICKSHANK, E. K. **Wernicke's Encephalopathy.** *Quart. J. Med.* (n.s.) 1950, Oct., v. 19, No. 76, 327–38. [45 refs.]

Superior haemorrhagic encephalitis was first described by Wernicke in 1881, and groups of cases have been periodically recorded since. The clinical signs of the condition, as originally described, were paralysis of the eye muscles, a reeling gait, and disturbances of consciousness. The pathological findings were punctate haemorrhages in the vessel sheaths in the tissue lining of the third ventricle, in the corpora quadrigemina, and in the retinae. Lesions have subsequently been described almost constantly in the corpora mammillaria and, less constantly, in the other hypothalamic nuclei. Many of the early cases were associated with alcoholism. During the 1930's evidence, both clinical and experimental, accrued, associating Wernicke's syndrome with vitamin B_1 deficiency.

This paper describes in detail 8 cases of Wernicke's encephalopathy which occurred among British prisoners of war in the hands of the Japanese in Changi Camp, Singapore. During the early period of internment, nearly 100 patients presented the clinical features of Wernicke's encephalopathy and the findings in 52 of them have been reported by DE WARDENER and LENNOX [this *Bulletin*, 1947, v. 44, 450]. Beriberi was prevalent at this time and the ratio between vitamin B_1 and non-fat-calories was below the critical level of 0·3 mgm. per 1,000.

In 5 of the 8 cases recorded the onset was preceded by diarrhoea. Nystagmus was the earliest sign to appear and was followed in most cases by severe and effortless vomiting. Subsequently diplopia, ophthalmoplegia and mental disturbances occurred. Other signs of vitamin B_1 deficiency were absent in 6 of the 8 cases.

Small doses of vitamin B_1 (2–4 mgm. by injection) caused immediate cessation of the vomiting and disappearance of the ocular paralysis. Six of the patients recovered, three having residual mental changes ; of the two patients who died, one was moribund on admission and in the other, the first of the series, the diagnosis was only made *post-mortem* when the characteristic haemorrhagic lesions were found in the basal nuclei.

Analysis of the conditions under which these cases occurred, and the frequent presence of diarrhoea or dysentery, suggest that Wernicke's syndrome is most

likely to be met with when severe deficiency suddenly appears in a previously healthy community. The striking therapeutic results strongly support the theory that vitamin B_1 alone is the all-important factor in the production of the syndrome. *Dean A. Smith*

Ross, S. G. **Pellagra in Fiji.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 921–8.

Staple foods in Fiji are roots and tubers, such as yams, taro, sweet-potato and cassava, and coconut products. Animal and fish foods are eaten irregularly and green leaves are subjected to prolonged boiling in preparation. Although no quantitative survey is recorded the diet is considered to be low in protein and B vitamins.

In 15 months, 14 cases of " classical " pellagra were seen, 3 in Europeans ; these were believed to be the first cases recorded in Fiji. Sixteen further cases showed a pellagra-like dermatosis on exposed areas, which responded specifically to administration of nicotinamide. Many of the cases showed associated signs attributable to riboflavin deficiency, and the addition of riboflavin to nicotinamide in treatment accelerated recovery, the combination producing very rapid cure. *Dean A. Smith*

Mainzer, F. Fortschritte auf dem Gebiet der Pellagra-Forschung. [**Progress in Pellagra Research.**] *Klin. Woch.* 1950, Nov. 15, v. 28, Nos. 43/44, 729–38, 2 figs. [167 refs.]

Ferro-Luzzi, G. Un interessante aspetto di malnutrizione maligna occorso in nativo eritreo. [**Malignant Malnutrition in an Eritrean.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Sept., v. 31, No. 9, 615–37, 3 figs. [12 refs.] English summary.

This paper describes in much detail a fatal case of nutritional deficiency —its history, signs, symptoms and course, the very full laboratory and post-mortem investigations and the differential diagnostic features. The patient was a tribesman from the [? Danakil] Highlands aged 24. Up to 8 years before, he had followed the pastoral way of life of his fellow tribesmen in the [? Danakil] mountains and consumed the traditional diet which consists almost entirely of 2,500 gm. of goat's milk. The author has found that this [? daily] diet provides 122 gm. each of proteins and carbohydrates and 185 gm. of fats, with a total energy value of 2,641 calories. He found this diet to have 1,375 international units of vitamin A, 2,300 gamma of vitamin B1, 750 Sherman units of vitamin B2, 30·5 mgm. of vitamin C and 50 I.U. of vitamin D. [The values on which these figures are calculated are considerably higher than those obtained from analysis of goat's milk elsewhere.] The average energy output of a [? Danakil] herdsman is extremely low and these people normally show a satisfactory physical development and state of health because they seem to have struck a balance between their marginal type of diet and their biological and energy requirements.

After leaving his native highlands, this man worked as a porter in Massawa for 3 years and in Asmara for the remaining 5 years of his life. During these 8 years, his daily diet consisted of 800 gm. of the staple " bread " made with durra and " taf " and of 30 gm. of " sciro " which is a bean flour seasoned with red pepper and sometimes containing oil or other fat. On rare occasions he had some meat or milk. Experimenting on rats, the author has found that the amino-acids which are derived from durra and " taf " appear to include the liver-protective factors. He points out, however, that the protective action demonstrated in the laboratory may not necessarily represent what happens

in the human body more particularly when nutrition is as deficient as in the present case.

Clinically, this patient showed a marked cachexia, steatorrhoea, nutritional deficiency changes of the skin and mucous membranes, a low blood nitrogen content, a hypochromic anaemia and evidence of peripheral neuritis. The " crazy pavement " appearance, achromotrichia, oedema and fatty liver, which are characteristic of kwashiorkor, were absent in this case. Post-mortem examination showed some inflammation of the bowel and regressive and haemorrhagic changes in the liver.

[The point that the energy output in a porter's life must needs be considerably higher than that of a pastoral tribesman is not raised in this very detailed paper.] *J. Cauchi*

WALT, F., WILLS, Lucy & NIGHTINGALE, R. P. **Malignant Malnutrition.** *South African Med. J.* 1950, Nov. 4, v. 24, No. 44, 920–25, 1 fig. [19 refs.]

This report is based on studies of 36 consecutive cases of malignant malnutrition (kwashiorkor) admitted to the McCord Zulu Hospital, Durban, in 1949. All but one of the children had been breast-fed and symptoms started after weaning when the infants' food consisted almost entirely of carbohydrate —chiefly maize and Kaffir corn porridge. None of the patients had malaria or hookworm infestation, the only tropical parasitic disease being ascariasis in a few of the older patients.

The symptoms consisted of marked anorexia with irritability and some diarrhoea. The signs were oedema, soft, depigmented hair, small, scattered areas of hyper-pigmentation on the skin which later desquamated, angular stomatitis, buccal ulceration, glossitis, enlarged liver and wasting. A few of the cases conformed to an atrophic type, gross wasting without oedema being the main feature.

There was a moderate, slightly macrocytic, normochromic anaemia in the majority of cases, with red cell counts of about 3,000,000 per cmm., and haemoglobin levels averaging 10·1 gm. per cent. ; serum protein levels were reduced to an average of 4·4 gm. per 100 ml., the main reduction being in the albumin fraction. Post-mortem examination of the four fatal cases showed enlargement and marked fatty infiltration of the liver. Treatment with a very high protein diet proved remarkably successful and caused an immediate rise of the serum protein level with diuresis, disappearance of the oedema, and good clinical improvement. The death rate of the entire series was 11 per cent., but if those dying within 24 hours of admission are excluded, the rate was only 2·8 per cent.

The high protein diet was administered in the form of " maas " which was prepared as follows :—

" At 4 a.m. 4 oz. of fresh cream are put in a cup which stands in hot water ; four hours later, 2 oz. of machine-skimmed cow's milk are added to this cream, the surrounding water still being kept warm. Eight hours later two more ounces of skimmed milk are added to the ' culture ' and this is allowed to stand for a further 16 hours. Then the contents are added to two gallons of skimmed milk and are stirred in well and left to stand a further 24 hours, when it is offered for the first time as ' mass '."

The quantities given varied from 4 to 8 oz. every 2–3 hours and, as appetite improved, 8 oz. feeds were given 7 times daily in the majority of cases. On the routine treatment, the protein intake was between 40–50 gm. daily. This high intake was well tolerated, even by severely ill children, and is thought to have been responsible for a death rate very much lower than those in most comparable series. *Dean A. Smith*

ANDERSON, C. G. & ALTMANN, A. **The Electrophoretic Serum-Protein Pattern in Malignant Malnutrition.** *Lancet.* 1951, Jan. 27, 203–4. [11 refs.]

THOMSON, Florence A. **Nutritional Ill Health among Malay Children in the Ipoh District of Perak, Malaya. A Case described of Severe Malnutrition with Enlarged Liver.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Dec., v. 44, No. 3, 339–46, 3 figs.

Investigations among mothers and children have revealed very faulty dietary practices and the prevalence of nutritional ill-health. Rice, the staple, is supplemented mainly with purchased vegetables, some dried fish, sugar and sweetened condensed milk. Meat and fresh milk, although available at times, are rarely used. Custom imposes on pregnant and nursing mothers an unhygienic régime and a further restricted diet. Artificial feeding, with tinned milk, is increasing. Dietary deficiency of protein, minerals and vitamins prevails and clinical manifestations of these deficiencies are widespread.

A number of severe cases of malnutrition in small children, conforming to the malignant malnutrition (kwashiorkor) pattern, have been seen. One such case is described in detail. The outstanding clinical features were wasting ; skin, tongue and hair changes ; anaemia ; steatorrhoea ; and liver enlargement. Recovery was rapid and apparently complete after treatment with a generous diet, supplementary milk and liver. Partial relapse occurred after withdrawal of the milk and liver supplements. *Dean A. Smith*

MENEGHELLO, J. ; NIEMEYER, H. ; ESPINOSA, J. **Liver Steatosis in Undernourished Chilean Children. I. Its Evolution as followed by Serial Puncture Biopsies** [MENEGHELLO, NIEMEYER & ESPINOSA]. *Amer. J. Dis. Children.* 1950, Dec., v. 80, No. 6, 889–97, 2 figs. [Refs. in footnotes.] **II. Study on some Liver Function Tests** [NIEMEYER & MENEGHELLO]. *Ibid.* 898–904, 1 chart. [Refs. in footnotes.] **III. Evaluation of Choline Treatment with Repeated Liver Biopsies** [MENEGHELLO & NIEMEYER]. *Ibid.* 905–10, 2 charts. [Refs. in footnotes.]

These papers are based upon the study by serial liver biopsy of 92 children presenting a syndrome of " plurideficiency dystrophy " apparently similar to malignant malnutrition (kwashiorkor) and infantile pellagra [of which many reports have appeared in this *Bulletin*].

I. The children, whose ages were between 1 and 2½ years, had histories of high carbohydrate, low protein diets since weaning and showed manifestly retarded growth. Diarrhoea was frequently the main complaint. Characteristically there were oedema, anaemia and hypoproteinaemia with lesions of skin, hair and mucous membranes, and hepatic enlargement.

Intense fatty infiltration was the outstanding histological change in the livers examined, and the cases were classified according to the amount of fat in the cells and the size of the fat droplets. In stage I, the most severe grade, large single fat droplets seemed to fill almost all liver cells. In stage II the drops appeared in all sizes but were less widely distributed, being mainly found at the periphery of the lobules. Stage III was characterized by scarcity of fat which appeared as small drops, while in stage IV fat was absent or almost absent but cytoplasm had a finely cloudy or granular appearance. Other changes noted were obliteration of the sinusoids in a proportion of stage I cases, and cellular infiltration of the portal spaces in cases of all grades of severity.

Treatment with a high protein, low fat diet, based upon skimmed milk, resulted generally in clinical improvement, disappearance of liver fat and return

of plasma protein levels to normal. Babies who on admission had stage I steatosis of their livers usually reached stage III or IV in about two months. Mortality is stated to have been lower than in other reported series but the number of deaths is not reported.

II. Liver function tests of the flocculation type (colloidal gold, scarlet red, thymol turbidity and cephalin-cholesterol) were performed at the same times as liver biopsy on 31 of the above children. Their results bore no consistent relationships either to clinical condition or to the degree of liver steatosis, and while children were improving under treatment the intensity of flocculation might increase, decrease or remain unchanged. Similarly the results of dextrose and galactose tolerance tests failed to indicate reliably the severity of the condition or the response to treatment.

III. In order to assess the value of choline in the treatment of this condition, 41 children who had grade I (the severest) fatty infiltration of the liver were selected. Of these 23, selected at random and comparable to the control group of 18, were given choline hydrochloride, 5 gm. daily for at least 10 days, in addition to the high protein diet which all received. The rate of disappearance of fat from the liver was assessed by serial liver biopsy. At the end of 10 days 5·6 per cent. of the controls and 47·8 per cent. of the choline-treated had improved to stage II steatosis. At 20 days the figures were 50·0 per cent. and 82·6 per cent. respectively. Improvement to stage III also occurred significantly earlier in the treated group, but it is to be noted that all those in the control group eventually reached as satisfactory a degree of improvement as did those treated with choline.

These results indicate that administration of choline accelerates removal of liver fat in these cases of pluri-deficiency dystrophy but may not influence the ultimate degree of improvement achieved. *Dean A. Smith*

SPRUE

DUBARRY, J. J., CASTETS, H. P. & DUSSERT, A. Sur un cas de sprue nostras gravissime traité par la vitamine B12. [**A Severe Case of "Sprue Nostras" treated with Vitamin B12.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1950, Nos. 23/24, 1262–73, 2 figs.

GÜNTHER, P. G. Zur Pathogenese und Therapie der Sprue. [**Pathogenesis and Treatment of Sprue.**] *Med. Klin.* 1950, Dec. 8, v. 45, No. 49, 1553–7. [28 refs.]

The main theme of this paper concerns a case of non-tropical sprue in a man of 44, in whom all the well-known drugs (with the exception of vitamin B_{12} which was unprocurable) had failed. The author therefore considers it is worth recording that improvement in his general condition and disappearance of fatty diarrhoea took place within a few days of the institution of supronal treatment (supronal is a sulphonamide allied to sulphaguanidine and sulphasuxidine, which the reviewer is quoted as having advocated in tropical sprue). The case was one of long standing (some 17 years), while biochemical investigations undertaken on an extensive scale provided ample evidence of the correctness of the diagnosis. After a sojourn of some three months in hospital, supronal treatment was initiated with an initial dose of 8 gm. daily, gradually decreasing by 1 gm. to 4 gm. which figure was maintained for the next 13 days. Improvement became obvious from the 3rd day of treatment onwards with an increase of weight, of 6 kgm. within one month, and this was maintained for the

subsequent three, when a relapse necessitated further treatment. A second, and more intensive, course brought about a comparable improvement, not only in the well-being and body weight, but also in the blood picture.

The author surmises that this favourable result, which is so striking, must be due to the bacteriostatic action of sulphonamide therapy and the consequent alteration of the intestinal bacterial flora. *P. Manson-Bahr*

HAEMATOLOGY

HOLMES, E. G., GEE, F. L., ASEA, S. B., BHIMA, S., CHAGULA, W. K., EVELIA, T. R., KASIRYE, J. W. S., KIBONEKA, G. H., LUGAZIA, M. Y., MAJALE, M., MUGHAIRY, M. S., OCHIENG, E. C., GESA, J. I. H. & MAGAMBO, J. C. **Red Blood Count of East African Students.** *East African Med. J.* 1950, Sept., v. 27, No. 9, 360–70, 1 chart. [54 refs.]

Blood counts were carried out by fourth-year medical students at Makerere College Medical School, Kampala, Uganda (altitude 4,100 feet) on themselves and their friends. Duplicate red cell counts were made on blood from finger pricks of 71 subjects and on blood taken from a vein of 26 subjects. The means and standard deviations were $6{\cdot}450 \pm 0{\cdot}541$ millions per cmm. and $6{\cdot}108 \pm 0{\cdot}573$, respectively. In a third group of 20 subjects the blood (venous) was examined by each of three to six students and more complete counts made ; the means obtained were as follows :—

Red blood cells	$= 5{\cdot}99 \pm 0{\cdot}521$ millions per cmm.
Haemoglobin	$= 16{\cdot}55 \pm 1{\cdot}81$ grammes per 100 ml.
Packed cell volume	$= 49{\cdot}4$ per cent. $\pm 2{\cdot}45$

The means of the calculated values were MCV=82·5 c.μ, MCH=28·1 $\gamma\gamma$ and MCHC=32·3 per cent.

A statistical appraisal of errors due to lack of skill and other random factors showed that these were well within the figures generally accepted as inevitable.

A table is given of the means of red cell counts in different countries and different altitudes, from sea level to 16,700 feet, with the appropriate references to the literature. Analyses of these figures show that there is a high positive correlation (r=0·74) between red cell counts and altitude ; the regression of the red cell count on altitude is $5{\cdot}25 \times 0{\cdot}134$ per 1,000 feet.

The red cell counts made from venous blood were significantly lower than those made from capillary blood ; other workers have also noted this. The authors suggest that this may be due to evaporation (and concentration) of capillary blood while it is being taken, and in a small experiment they showed that a drop of blood loses weight very rapidly ; in one instance as much as 7·2 per cent. of weight was lost in 30 seconds. *L. E. Napier*

CHEEK, E. B. **Cyanhaematin Method of Estimating Haemoglobin.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Dec., v. 44, No. 3, 352–3.

This correspondent, writing from the Institute of Medical Research, Kuala Lumpur, refers to the paper of LEHMANN and BAIRD [this *Bulletin*, 1950, v. 47, 76] reporting difficulties with turbidity in haemoglobin estimations by the cyanhaematin method used in warm climates.

He reports a modified method used at the Army Medical Centre, Washington, which he has used in a survey in Malaya involving more than 1,000 determinations of haemoglobin.

The reagent is made from 100 mgm. sodium cyanide and 400 mgm. potassium ferricyanide in 1 litre of distilled water. For each estimation, 20 cmm. of blood are added to 6 ml. of reagent and mixed thoroughly. The resulting cherry-red colour is estimated (after not less than 30 minutes) in an Eel colorimeter with an Ilford tri-colour green filter (or a Coleman Junior Spectrophotometer, λ 540 may be used). Six ml. of the reagent are taken as a " reference solution ".

Exposure to sunlight causes turbidity from insoluble iron compounds, but the reagent is stable over long periods if it is kept in a pyrex bottle away from direct sunlight. Estimations were made up to 4 days after blood was added to the reagent and the tubes stored at room temperature (maximum 33°C). No loss of density was found after filtration through Whatman No. 42 paper. A cuvette containing blood of known haemoglobin content in 6 ml. of reagent may be sealed and kept permanently as a standard. *H. J. O'D. Burke-Gaffney*

Dierckx, F. & Helmons, J. Étude de la vitesse de sédimentation et de ses concomitants physiologiques chez le noir d'Afrique centrale. [**A Study of the Erythrocyte Sedimentation Rate and its Physiological Concomitants in Central Africans.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 411–27.

Haematological studies were made upon 100 young male adults in Coquilhatville, Belgian Congo. The general health and nutritional status of the subjects was regarded as above that of the general population. In spite of the prevailing conviction that erythrocyte sedimentation rates in Africans are usually high, values found in this group, by the Westergren method, were within normal limits, 83 subjects having rates of less than 15 mm. in one hour. Of the 17 who had higher rates, 8, on investigation, showed evidence of tuberculosis or rheumatic affection and the remaining 9 had abnormal plasma protein patterns. Sedimentation rates appeared to be generally related to fibrinogen levels. Total plasma protein levels generally approached or exceeded the upper limit of normality, the main increase being due to hyperglobulinaemia. Intestinal parasitization, filariasis, syphilis, yaws, malaria and minor hepatic disturbances were among the conditions found which appeared to have no effect on the erythrocyte sedimentation rate. [In this paper many authors are quoted, but no references are given : a number of unfamiliar abbreviations used are not explained.] *Dean A. Smith*

Hanno, H. A. & Margolies, M. P. **Rapid Carbon Dioxide Test for Sickling.** *Science.* 1950, July 28, 109–10.

The authors report yet another method of testing for sickle-cell disease. This, like all other methods, depends on reducing the oxygen tension in the red cells. Five to ten ml. of blood are collected in an oxalate tube and then poured into a 250 ml. Erlenmeyer flask. A stream of carbon dioxide is directed into the flask for 10 to 15 seconds and then the flask is stoppered and agitated until the blood becomes dark. After 5 minutes a drop of blood is rapidly transferred to a clean cover-slip and a preparation sealed with vaseline examined under the high-power objective of a microscope. In a case of sickle-cell disease, sickling of a percentage of the red cells is " obvious and unequivocal ".

Positive results were obtained immediately with blood samples of 27 Negro patients whose blood had shown sickling in 1 to 57 hours by other techniques, and in 10 samples in which there was no sickling by other methods a negative result was obtained.

Partial oxygenation occurs while the blood is being transferred to the slide, but this is insufficient to affect the result if the operation is done reasonably quickly. Formalin fixation is not considered necessary.

The method is very rapid and very practical, and the results appear to be quite reliable. *L. E. Napier*

Lambotte-Legrand, J. & Lambotte-Legrand, C. Un cas d'ovalocytose familiale chez une enfant noire du Congo Belge. [**A Case of Familial Ovalocytosis in an African Child in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 659–62.

The following is a translation of the authors' summary :—

Observation of a case of familial ovalocytosis in an African child whose ancestors originated in the Lake Leopold II area.

H. J. O'D. Burke-Gaffney

Janssens, P. G. Een geval van Erythroblastenanaemia. [**A Case of Erythroblastic Anaemia.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 639–41, 1 pl.

The following is a translation of the author's summary :—

Description of a case of erythroblastic anaemia, probably of the Cooley type, in a Central African child. *H. J. O'D. Burke-Gaffney*

Lippi, M. & Floris, M. Probabile azione rivelatrice della malaria in due casi di ittero emolitico familiare. [**Probable Action of Malaria in revealing Two Cases of Familial Haemolytic Jaundice.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Sept., v. 31, No. 9, 692–707, 2 figs. [24 refs.]

The English summary appended to the paper is as follows :—

" In a family, where the mother and 3 children gave signs of diminished globular resistance and increased bilirubin content of the blood with indirect diazo reaction, 2 children 14 and 8 years old, suffered from clinically evident haemolytic jaundice. As these two children, like their mother and the third brother, had suffered in early childhood from a malaria infection with severe and repeated relapses, and as the symptoms of the jaundice became evident when there existed already an advanced stage of splenomegaly, the writer is of the opinion that the jaundice developed on a constitutional basis and that the malaria revealed the disease."

Spies, T. D., Garcia Lopez, G., Milanes, F., Lopez Toca, R., Reboredo, A. & Stone, R. E. **The Response of Patients with Pernicious Anemia, with Nutritional Macrocytic Anemia and with Tropical Sprue to Folinic Acid or Citrovorum Factor.** *Southern Med. J.* 1950, Dec., v. 43, No. 12, 1076–82, 4 figs. [17 refs.]

A number of investigators have studied a naturally occurring group of substances structurally and functionally closely related to folic acid, which were found to be a hundred times as active in preventing the inhibition of the so-called folic acid inhibitor. Some call these substances the folinic acid group : others call them citrovorum factors.

It is possible that members of this group might be more active than folic acid in the treatment of pernicious anaemia, nutritional macrocytic anaemia, and of tropical sprue.

For this purpose, four patients with pernicious anaemia, four with sprue, and two with nutritional macrocytic anaemia were selected, with the following criteria :—

(1) The patient must have a macrocytic anaemia.
(2) The bone marrow must show erythroblastic arrest characteristic of macrocytic anaemia.
(3) The red blood cell counts must not be over 2·5 million.
(4) The reticulocyte counts must be low throughout the preliminary period of observation.
(5) Glossitis must be present.
(6) The patient must be untreated or must not have been treated recently enough to interfere with the evaluation of the effect of the anti-anaemic factor.

The folinic acid was supplied by the Eli Lilly Chemical Company in 1 cc. ampoules which supplied 100 units ; one unit is approximately 1 μgm. of pure citrovorum factor and equivalent to 10 Lederle units. The citrovorum factor was obtained from the Lederle laboratories : it came in 1 cc. ampoules which supplied 20 million units. One unit of the citrovorum factor equals 0·0001 μgm. of pteroylglutamic acid (folic acid).

Folinic acid was given in doses of 200 units, daily, intramuscularly for 10 days. Two patients had submaximal clinical and haemopoietic responses. The other four did not respond to folinic acid.

Four patients given citrovorum factor in much larger doses, *e.g.*, 20 million units daily for 10 days, had maximum clinical and haemopoietic response.

It is claimed that these findings show that folinic acid, or citrovorum factor, when administered in adequate amounts, is an efficient anti-anaemic substance in promoting blood regeneration in persons suffering from pernicious anaemia and nutritional macrocytic anaemia and tropical sprue in relapse.

The clinical response paralleled the haemopoietic response.

P. Manson-Bahr

Spies, T. D., Garcia Lopez, G., Milanes, F., Lopez Toca, R. & Reboredo, A. **Antianemic Properties of a Reaction Product of Vitamin B_{12} and the Intrinsic Factor.** *Southern Med. J.* 1950, Mar., v. 43, No. 3, 206–8.

Bethell and others (*University Hospital Bulletin*, Ann Arbor, Mich., 1949, v. 15, 49) have reported an " activating " factor in hog intestine. The present authors found that large quantities of hog intestine were required to prove the extract, of which a sizeable dose was necessary to produce an adequate haemopoietic response in the macrocytic anaemias. They have recently used a conjugate, " berubozyme ", prepared by allowing a concentrate of hog duodenum to react with vitamin B_{12}. By giving one capsule, which represents 0·33 gm. of hog duodenum concentrate and nine mgm. of vitamin B_{12} daily by mouth for ten days they have been able to produce considerable haematological and clinical response in 4 patients with macrocytic anaemia ; two were cases of tropical sprue, one of nutritional macrocytic anaemia, and one of pernicious anaemia. Reticulocyte peaks of 17·0, 16·8, 14·2 and 6·0 per cent. were recorded on the 7th, 10th, 9th and 11th days, and in 14 days the red cell counts rose by 0·68, 0·83, 0·70, 0·44 million per cmm., respectively.

The authors point out that the responses were not maximal and that a longer period of treatment is indicated, but that their results suggest that a practical and simple method of oral therapy is " near at hand ". They could not continue or increase the dosage in these cases on account of shortage of material.

L. E. Napier

VENOMS AND ANTIVENENES

KEEGAN, H. L., BLAUW, A. S. & ANDERSON, R. I. *Latrodectus geometricus* **Koch on Luzon.** *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 901–7, 4 figs. on pl. [13 refs.]

Before 1939 *Latrodectus haseltii* was the only species of this genus recorded in the Philippines, but recently many specimens of *L. geometricus* have been captured in dwellings and out of doors. This species has been observed in Australia, Africa, Hawaii, India and North and South America and, if it has not been confused with other species of *Latrodectus*, is probably a recent introduction into Luzon. The authors state : " It would, in fact require a trained observer to distinguish a dark coloured specimen of *geometricus* from either *mactans* or *haseltii*. Since *geometricus* occurs in the ranges of both these species, it may be responsible for some of the bites credited to them."

The effects of the venom on laboratory animals exhibit considerable variation. It has been tested by allowing the spiders to bite the shaven leg of the test animal, or by subcutaneous injection of emulsion of ground-up cephalothoraces. The symptoms produced were dyspnoea, tremors, paresis in 15 to 30 minutes, with salivation and lachrymation. *Post-mortem*, fatty infiltration, haemorrhage and necrosis of the liver were the chief findings and there might be pulmonary and pericardial haemorrhages. Animals which recovered might be lethargic and off their food for about a week. Death usually occurred in 12–24 hours, but many animals survived though they received a larger amount of the toxin than some which died. It was the general impression from these animal tests—there were no human cases for comparison—that the venom of *L. geometricus* is less toxic than those of *L. mactans* and *L. haseltii*. DDT as powder, spray or aerosol effectively destroys the spiders and certain (unindentified) predaceous wasps are its natural enemies and the parasitic *Eurytoma arachnovora* destroys many egg-sacs. *H. Harold Scott*

GAUD, J. & DELESALLE, D. Aranéisme dû aux morsures de Latrodectes au Maroc. [*Latrodectus* **Spider-bites in Morocco.**] *Bull. Inst. Hyg. Maroc.* 1949, v. 9, Nos. 3/4, 233–7, 1 fig. on pl. & 1 map.

The species of *Latrodectus* responsible for serious bites in Morocoo is *L. schuchi*, locally known as *Bou siha*. Bites are more frequent in dry summers after heavy spring rains and in the autumn when the autumn rains are late. Brief details are given of eight cases. The symptoms varied from local pain and headache and perhaps vomiting, in mild cases, to severe general muscle pains, paresis, dyspnoea, profuse sweats and weakness which persists for several days. The sweating may be peculiarly localized to the neighbourhood of the bite. There is no record in the authors' experience of any fatalities even among young children bitten. *H. Harold Scott*

DERMATOLOGY AND FUNGUS DISEASES

PAMPIGLIONE, S. La spirochetosi discromica. [**Pinta.**] *Riv. di Parassit.* Rome. 1950, Dec., v. 11, No. 4, 233–59, 4 figs. & 1 map. [225 refs.]

A general review of the subject and literature.

LANE, J. Dados sôbre os simulídeos de localidades onde ocorreram casos de pênfigo foliáceo. [**Observations on Simuliidae in Area where Cases of Pemphigus Foliaceus occur.**] *Arquivos Facul. de Hig. e Saude Pública. Univ. de São Paulo.* 1949, June, v. 3, No. 1, 53–4.

FURTADO, T. A. Ensaios terapêuticos no pênfigo foliáceo. [**Trials of Treatment of Pemphigus foliaceus.**] *Brasil-Medico.* 1950, Nov. 4 & 11, v. 64, Nos. 44/45, 249–56, 10 figs. [43 refs.] English summaries.

So long as the cause of pemphigus foliaceus remains unknown the treatment of it can only be on empirical lines. Moreover, in a disease which may exhibit spontaneous remissions it is not easy to gauge to what extent any improvement which occurs is due to the treatment employed.

The author first tried vitamin D in large doses for three patients—a man of 30 who had been ill for 4 years, a woman of 53 whose duration of illness had been 12 years and a lad of 15 years whose disease was in the early bullous stage. The vitamin was started in doses of 100,000 units daily and gradually raised to 600,000 units and was kept there. None showed any signs of intolerance, though the female patient had hypercalcaemia to 12·6 mgm. per cent.

Next, sulphonamides were tried on 5 other patients, four adults and a boy of 15 years. Three of these were given sulphapyridine and the other two a preparation known as Lutazol (para-sulphamido-phenyl azosalicylate of potassium) in doses of 3–4 gm. daily for periods from 6 weeks to 4 months. None showed any signs of intolerance and the general impression was that distinct benefit resulted. *H. Harold Scott*

CAMPINS, H., SCHARYJ, M. & CORTÉS, R. J. Coccidioidomicosis en Venezuela. Relación del segundo caso estudiado. [**Account of the Second Case of Coccidioidomycosis studied in Venezuela.**] *Sesiones Dermatologicas en Homenaje al Profesor Luis E. Pierini. Buenos Aires, 11 al 13 de noviembre de 1949.* pp. 73–8, 4 figs. 1950, Buenos Aires: Lopez y Etchegoyen S.R.L., Junin 863.

The English summary appended to the paper is as follows :—

" The second proven case of coccidioidomycosis in Venezuela, is presented. This case, as was the first, is a chronic, disseminated form or coccidioidal granuloma. So the existence of an endemic area of this disease in our country is reaffirmed."

REINGOLD, I. M. **Myocardial Lesions in Disseminated Coccidioidomycosis.** *Amer. J. Clin. Path.* 1950, Nov., v. 20, No. 11, 1044–9, 2 figs.

Miliary, granulomatous infiltrations in the myocardium are not uncommon in cases of disseminated coccidioidomycosis. Usually they consist of collections of monocytes, lymphocytes and polymorphonuclear cells with occasional giant cells, but only occasionally have the spherules of *Coccidioides immitis* been found in them and so their causation is often undetermined.

In four cases of generalized coccidioidomycosis, one of which was complicated by tuberculosis and another by diabetes mellitus with gangrene, studied at autopsy by the author, lesions in the myocardium were demonstrated. Macroscopically, morbid changes in the heart muscle were seen in only one case, and these consisted merely of tiny tubercles, just discernible, in the ventricular myocardium, without associated pericarditis or endocarditis. Microscopically, the miliary lesions were seen to be formed of an accumulation of monocytes, lymphocytes, polymorphonuclear cells and multinucleate giant cells and, in one of the granulomata, a body resembling the parasitic spherule of *C. immitis* was seen. There were similar, small cellular infiltrations in the visceral pericardium. Some of the lesions showed granular and necrotic changes, and the muscle bundles, separated by the infiltration, showed swollen fibres with indistinct striations and rather pyknotic nuclei. In the other three cases the heart showed similar but smaller granulomatous infiltrations which, however,

were non-specific in so far as no fungal spherule was found in any of them. In the absence of the parasitic spherule, it is not possible to distinguish these granulomata from those found in tuberculosis.

An analytical table of the four cases is given. *J. T. Duncan*

HEAT STROKE AND ALLIED CONDITIONS

Eichna, L. W., Park, C. R., Nelson, N., Horvath, S. M. & Palmes, E. D. **Thermal Regulation during Acclimatization in a Hot, Dry (Desert Type) Environment.** *Amer. J. Physiol.* 1950, Dec. 1, v. 163, No. 3, 585–97, 4 figs. [17 refs.]

When one works in a hot environment for the first time the body temperature rises to an abnormally high level, and there occur circulatory and other disturbances which often prevent effective work and at times produce outright disability. Repetitions of work in the heat lead to acclimatization. Adaptive mechanisms are developed which permit one to perform work at a given rate with nearly the same rectal temperature in the heat as in a cooler environment. Acclimatization restores the normal relationship so that, as in cooler conditions, the rectal temperature is determined by the metabolic rate. At the same time the undesirable disturbances of the unacclimatized state are reduced, or fail to appear.

This paper reports a study of the thermal balance during acclimatization to a hot, dry environment. Three healthy young men were first physically conditioned by road marches and walking on the treadmill. Then there were nine days of test activity in a cool environment (78°F. dry bulb, and 62° wet bulb), followed by ten days of tests in the heat (123°F. dry bulb and 80°F. wet bulb). Then followed two days in which tests were repeated in the cool environment. Initial physiological observations were made in a cool room (78°F.), and then the men entered the test chamber and underwent the test hour of work. This consisted of five periods of 10 minutes each of walking on a treadmill in a wind tunnel, each period being followed by an interval of 2 minutes when the men were weighed and drank salted water to compensate for the sweat lost. Walking was at $2\frac{1}{2}$ miles an hour on a $2\frac{1}{2}$ per cent. gradient, facing the wind which had a speed of 450 ft. per minute. Thereafter the men rested for 4 hours and then for 2 hours they marched with 20-pound packs so as to maintain fitness and acclimatization. After this 7-hours exposure they returned to their quarters, which were kept at 78°F. In the test hour the metabolic rate averaged 178 Cal. per sq. metre per hour.

In the initial cool-room experiments the rectal temperature at the end of the test hour averaged 37·9°C., and the heart rate 108. In the first exposure to heat the heart rate was 162, and the rectal temperature 39°C. With successive exposures to heat these values declined, and in the tenth exposure the heart rate was 118 and the rectal temperature 37·9°C. Final cool-room values were 102 and 37·7°C.

The main adaptive mechanism of acclimatization which produced these changes was a further increase of 10 per cent. in sweat production. The increase in evaporative cooling due to this accounted for 75 to 90 per cent. of the reduction in body temperature. In the first heat experiment the heat content of the body increased by 67 Cals. per hour for each square metre of body surface, but in the last heat experiment the heat gain was reduced to 27 Cals. per sq. metre per hour. There was a small decrease (4 per cent.) in metabolic heat production,

but this accounted for only 5 to 20 per cent. of the reduction in body heat content.

Two dissimilar effects were due to the lowered skin temperature caused by the increased evaporative cooling. The heat gains by convection and radiation were increased by 8 per cent., and this change required twice as great an increase in sweat secretion as would have been needed if the skin temperature had not fallen. Secondly, the internal thermal gradient widened so that a smaller "peripheral blood flow" (70 per cent. of that in the initial heat experiment) was enough to transfer the required heat from the deeper parts to the periphery.

Thomas Bedford

MISCELLANEOUS DISEASES

GARCIA, E. Y. & CALIMBAS, Angela L. **Malaria Therapy of Hypertension : a Report of Four Cases.** *Philippine Sci. J.* 1950, July, v. 1, No. 1, 2–13, 1 fig. [12 refs.]

Four patients diagnosed as having essential hypertension were inoculated with malaria parasites (3 with *P. vivax* ; 1 with *P. malariae*). In all of them the systolic and diastolic blood pressures fell rapidly to normal limits. The blood pressures were normal on further examination after termination of the malaria therapy, in 2 years, one year, 1 month and 1 month respectively.

The authors suggest that the malaria parasites by some means or other cause an increase in blood flow through the already ischaemic kidneys and so reduce the secretion and release of renin, so lowering the production of angiotonin.

[The paper is not very impressive. It contains far too much diffuse discussion on the current theories of the genesis of hypertension and far too little detail and discussion of the cases described.] *B. G. Maegraith*

DIAZ RIVERA, R. S., PONS, E. R., Jr. & RAMIREZ, E. **Pulmonary Eosinophilia. A Preliminary Report on 15 Cases of Tropical Eosinophilic Asthma.** *Bol. Asoc. Méd. de Puerto Rico.* 1950, Apr., v. 42, No. 4, 197–205. [32 refs.]

This is a report on a series of 15 cases of pulmonary eosinophilia. All the patients were Porto Ricans, 14 males and 1 female, aged from 12 to 65 years.

The clinical course of the disease followed a very definite pattern in the majority of cases. The onset occurred with chills and fever, body pains, a cough with scanty sputum, and pain or oppression in the chest with dyspnoea.

General lymph gland enlargement was common and gastro-intestinal symptoms occurred in five cases ; this initial phase lasted from 5 to 14 days. Frequent relapses occurred with all the above febrile and respiratory symptoms, and usually generalized lymph gland enlargement and loss of weight. Two of these patients were seen in the acute phase, but the duration in the remainder averaged 18·5 months. When seen all had asthmatic bronchitis and low fever, 99° to 101°F. ; 13 had lymphadenitis, 6 enlarged spleen and liver, and 5 had tonsillar hypertrophy. All showed a leucocytosis—average 18,900 per cmm., and a total eosinophile count from 7,936 to 19,600 per cmm.—average 65 per cent. of total leucocytes. The myelograms were normal except for an increase in the eosinophilic elements. The sputa showed numerous eosinophiles. Skigrams of the chest showed diffuse mottling in the pulmonary fields with increased hilar markings in some cases.

Anti-asthmatic treatment of various kinds produced only slight temporary improvement, and sulphadiazine and penicillin were equally ineffective. Twelve patients were treated by intravenous arsenic and three were observed

as controls. Mapharsen and neoarsphenamine were given in the usual doses. Eleven of these patients showed a rapid response ; the pulmonary symptoms and fever increased for two or three days after the first dose, but from the fifth to sixth day there was a marked clinical improvement which was maintained and was usually complete by the end of the second week.

One patient treated by arsenic failed to respond and was still having asthmatic attacks at the end of 15 months, although his blood picture was normal. The three controls were observed for 1 to 3 years, and these patients were still suffering from repeated asthmatic and bronchitic attacks with decreasing free intervals.

The eosinophile count increased with the post-treatment increase of symptoms, a marked improvement was observed by the end of the second week, but a final return to normal was not established until 6 weeks to 4 months.

Intestinal helminths were found in 11 cases, but, in 4, repeated examinations were negative. Anthelmintic treatment in several cases produced no effect on the symptoms, nor was the improvement with arsenicals delayed in those cases in which no anthelmintic treatment was given.

The authors conclude that the condition is probably an acute infectious disease with a tendency to chronicity unless treated ; that it is a generalized rather than an exclusively pulmonary disease ; that it is different from bronchial asthma but possibly identical with Löffler's syndrome ; that it is a rare form of allergy induced by a filtrable virus ; and that the invariably favourable effect of arsenic is due to mobilization or destruction of the eosinophiles and the later inhibition of their production. *L. E. Napier*

ZUMPT, F. & GLAJCHEN, D. **Tick Paralysis in Man. A Suspected Case due to *Rhipicephalus simus* Koch.** *South African Med. J.* 1950, Dec. 30, v. 24, No. 52, 1092–4.

Tick paralysis of man is known to occur in Queensland and on the east coast of New South Wales as a result of attack by *Ixodes holocyclus*. It is also known to occur in the north-western United States and British Columbia, where *Dermacentor andersoni* and *Haemaphysalis cinnabarina* are involved. *Rhipicephalus simus* has been implicated in Somaliland. Paralysis in domestic animals has been reported from South Africa, Crete, Jugoslavia and Soviet Asia. The present paper describes a case ascribed to the bite of *Rhipicephalus simus* in the Krugersdorp district of the Transvaal.

Paralysis follows attack by a tick, and is probably due to the injection of a toxic substance possibly derived from the tick's salivary glands. The point of attachment of the tick appears to be important ; attachment near the head or spinal cord is most likely to result in paralysis. Although a substance inducing paralysis may be extracted from all stages of many ticks, probably only adult females contain sufficient to affect man. A striking feature of most cases is the rapid disappearance of the symptoms after removal of the tick or its capitulum.

The symptoms are usually those of a rapidly progressing ascending paralysis, which renders the patient helpless in 24 to 48 hours. Occasionally vomiting, stiffness and aching in the extremities, restlessness, fatigue and photophobia may be found. Death may occur from respiratory paralysis, and may be preceded by convulsions. Sensory changes are rare.

In the Transvaal case reported here, recovery was unusually slow ; the patient, an adult African, remained in hospital for seven weeks after a tick had been removed from his lower abdomen. It is stated that the only human cases hitherto reported from Africa were those of VENERONI in Somaliland [this *Bulletin*, 1929, v. 26, 265]. *J. H. Sudd*

FERREIRA, J. M. & MEIRA, J. A. Tríade de Kartagener em paciente com esquistosomíase mansoni e moléstia de Chagas. [**The Kartegener Triad in a Patient with** *Schistosoma mansoni* **and** *Trypanosoma cruzi* **Infections.**] Reprinted from *Rev. Med. e Cirurg. S. Paulo.* 1950, v. 10, No. 9, 435–58, 18 figs. (3 coloured). English summary.

The Kartagener triad, or syndrome, comprises transposition of viscera, sinusitis and bronchiectasis. The present patient was a man of 21 years whose illness was said to have begun 16 months before with pain at the lower part of the right side of the chest and a feeling of fever, a cough with blood-stained expectoration ; he felt weak, had night-sweats, frontal headache and palpitation. Examination showed signs of bronchiectasis with paranasal and frontal sinusitis, infestation by *S. mansoni* and Chagas's disease diagnosed by xenodiagnosis and complement fixation. Also the viscera were totally transposed. Death occurred after 14 months in hospital and autopsy revealed the transposition (well shown in coloured plates), ova of *Sch. mansoni* in the large intestine and in the liver. The heart showed, in sections, myocarditis, but no definite collections of leishmanial forms of *T. cruzi*.

H. Harold Scott

LOEWENTHAL, L. J. A. **Treatment of Sandworm Disease with Hetrazan.** *South African Med. J.* 1950, Dec. 2, v. 24, No. 48, 999–1000.

The resistance of creeping eruption (sandworm disease) to treatment is well known and the author refers briefly to the various forms of therapy which have been used, with varying results.

He then refers to the use of hetrazan in this condition by CARRION (cited by VAN DE ERVE, *J. Investigative Dermat.*, 1949, v. 12, 69). Carrion gave 2 mgm./kgm. body weight by mouth thrice daily for 3 weeks and found that lesions disappeared from his patient and did not recur after 5 months' observation. Van de Erve treated 19 patients in doses of 1·5 to 4 mgm./kgm. of hetrazan thrice daily for 3 to 20 days : 14 of 17 patients completing the course were cured.

The present author, in Johannesburg, treated 8 patients who had contracted sandworm diseases in various parts of South Africa. He gave 2 mgm./kgm. hetrazan thrice daily.

The results are shown in a table. Five of the patients had shown the disease for less than 2 months : the other three had shown it for about 5 months. It is suggested that the duration of the disease in South Africa is about 4 months to one year. The ages of the patients were from 14 months to 36 years. Treatment lasted for 13 to 28 days and improvement was noted in 2 to 17 days after treatment began. Only one of the 8 patients was not cured after 4 weeks' treatment. Side effects were seen in two patients (brother and sister). The former had a morbilliform rash in the third week and the latter an eruption over the buttocks resembling erythema multiforme. These were regarded as allergic reactions to killed parasites. The eruptions cleared during the course of anti-histamine treatment.

The author suggests that better results might possibly have occurred if larger doses of hetrazan had been used, and he quotes ETTLEDORF and CRAWFORD [above] who have shown that as much as 10 mgm./kgm. may be given thrice daily for a week without signs of intoxication. It is suggested that a dosage "at 6 mg. for a week" may be still more satisfactory than that employed by the author in the treatment of sandworm.

H. J. O'D. Burke-Gaffney

PROTOZOOLOGY : GENERAL

FARQUHAR, H. G. **Congenital Toxoplasmosis. Report of Two Cases in Twins.** *Lancet.* 1950, Nov. 18, 562–4, 4 figs. (2 on pl.). [21 refs.]

Toxoplasmosis is being recognized in the British Isles with increasing frequency.

An infant girl, the first of premature (34 weeks) twins, was first seen at 8 months.

No abnormality was noted, except that the right eye remained closed for some time and when opened was seen to be smaller than the left, until this child was 5 months old when a swelling near the anterior fontanelle was noticed ; this was followed by rapid enlargement of the head, which had previously been unusually small. Blindness of the right eye was suspected and nystagmus noted. There were no convulsions or loss of consciousness.

When first seen the child was apparently blind but not deaf. There was hydrocephalus, right microphthalmos and enophthalmos, left chorio-retinitis (right retina not visible), limb spasticity, and brisk reflexes and extensor plantar reflexes. Radiography showed fine calcification anterior to the sella turcica and gross internal hydrocephalus. Serological tests for toxoplasma infection were positive : complement-fixation test—1 /40 ; neutralization tests, dye—1 /512 and chorio-allantoic membrane +.

The other twin, a boy, was in every way normal clinically except for a fine pigmentary deposit diffusely spread over both retinae, but his sera gave identical reactions with those of his twin sister.

The mother was well throughout the pregnancy and showed no abnormality except positive serological tests 1 /20, 1 /256, and +, respectively. The father was healthy and showed negative serological tests.

The possibility that the boy's high serological reactions were due either to antibody transmission *in utero* or in the milk are negatived on account of the lower titre in the mother and the relatively long persistence of antibodies in the infant. *L. E. Napier*

RILEY, I. D. & ARNEIL, G. C. **Toxoplasmosis complicated by Chickenpox and Smallpox. Report of a Case.** *Lancet.* 1950, Nov. 18, 564–5, 1 fig. [13 refs.]

An instance of *Toxoplasma* infection in a mother and child is reported. The infant was nine months old when she first came under observation. The father and mother were apparently healthy and had no unusual illnesses. The child was premature, weighing 4 lb. at birth ; she had a squint but otherwise appeared normal ; but at six weeks she had an illness diagnosed as measles. She was admitted to hospital with repeated convulsions which subsided on treatment with chloral. Her vision appeared normal. Her skull was asymmetrical and 15 inches in circumference ; the anterior fontanelle was prematurely closed. Her limbs were spastic and reflexes brisk, but there was no clonus ; plantar response was extensor. The left eye was small and showed old iritis and chorio-retinitis. The right eye showed a large patch of choroiditis near the macula and gross pigmentary disturbance peripherally.

Radiography showed small areas of calcification scattered throughout the skull.

Serological tests for toxoplasmosis were positive ; these included the cytoplasm-modifying dye test (1 /256), the rabbit skin neutralizing test (100 doses), and the dye-test titration (1 /250).

The blood showed an eosinophilia of 550 per cmm. The cerebrospinal fluid was turbid with an increase of cells and protein.

The child developed chickenpox and later smallpox and died. The mother was clinically normal, but the blood gave identical serological reactions.

L. E. Napier

MAGNUSSON, J. H. & WAHLGREN, F. **Human Toxoplasmosis : an Account of Twelve Cases in Sweden.** *Acta Path. et Microb. Scandinavica.* 1948, v. 25, Nos. 1/2, 215–33, 2 figs. [56 refs.] Discussion 234–6, 1 fig.

After a review of the present state of knowledge of human toxoplasmosis, the authors describe 12 cases which were observed by them in Sweden between 1934 and 1947. Five of these were cases of congenital toxoplasmosis in children, including three infants who died shortly after birth (30 minutes to 2 hours). Two were cases of children with residual symptoms of toxoplasmosis probably resulting from earlier congenital infection. Finally, five were the mothers of the children with congenital toxoplasmosis : in these the infection was symptomless.

The diagnosis of toxoplasmosis was established by positive serological tests, by clinical signs, or by both methods, while in the case of the dead infants autopsy revealed typical pathological signs and the presence of toxoplasms in the tissues.

In the discussion of this paper, WINBLAD reports another case of toxoplasmosis from Malmö in a girl who died 2 months after birth, while RUBARTH describes a fatal outbreak of this disease among hares, with congregations of toxoplasms in the liver.

C. A. Hoare

WESTPHAL, A. & SCHULTZ, W. Fruchttod bei Toxoplasmose. [**Foetal Death in Toxoplasmosis.**] *Deut. med. Woch.* 1950, Oct. 27, v. 75, No. 43, 1431–2. [13 refs.]

Suspecting that in many cases the death of foetuses and of new-born infants might be due to toxoplasmosis, the authors carried out investigations on this question, using Sabin and Feldman's dye-test. They first examined 100 healthy pregnant women—patients in the maternity wards : 97 gave negative reactions, 3 were at first doubtful (positive titre 1 : 25) but later also proved to be negative. They then turned to these women's children : 77 of these were examined 6 months after birth, but none of them revealed any clinical symptoms of toxoplasmosis. In the foregoing investigations it was clear that a negative dye-test indicated absence of toxoplasmosis in the mothers and their offspring.

When the authors carried out serological examinations of the mothers of stillborn infants, they found that only 3 gave a negative reaction, one was doubtful, but 9 were positive, with titres from 1 : 50 to 1 : 400. Serological examinations of two dead foetuses and of one infant who died shortly after birth were positive (titres 1 : 50, 1 : 200, 1 : 200 respectively). From these observations it is concluded that in 75 per cent. of stillbirths observed, latent toxoplasmosis in the mothers was the direct cause of death of the foetuses.

The authors emphasize the importance of treating latent infections in pregnant women with aureomycin, which has been successfully employed in toxoplasmosis by one of them [this *Bulletin*, 1950, v. 47, 1130].

C. A. Hoare

JASPER, D. E. **Toxoplasmosis in the Dog—Report of a New Case.** *J. Amer. Vet. Med. Ass.* 1951, Jan., v. 118, No. 886, 22–5, 4 figs. [12 refs.]

ENTOMOLOGY AND INSECTICIDES : GENERAL

COLONIAL OFFICE. **Colonial Research 1949–50. Colonial Insecticides, Fungicides and Herbicides Committee. Third Annual Report (1949–1950)** [HALL, W. J., Chairman] (pp. 125–49.) Cmd. 8063. 155 pp. 1950, Oct. London : H.M. Stationery Office. [3*s.* 6*d.*]

The first two parts of the report deal with membership of sub-committees and outline the scope of activities of the group. Part III summarizes the more important results of research and field trials. The following observations have been made by the Colonial Insecticide Research team working at Porton :—

Previous work had shown the importance of dispersible powders as a means of applying insecticide to mud and plaster walls. The importance of particle size and shape has been studied. It was found that very small particles (10–20 μ) are much more effective than larger ones. Ground DDT crystals at this rate were more effective (to mosquitoes) at 6 mgm. per sq. ft. than particles of 20–40 μ at 50 mgm. per sq. ft. or particles of 40–80 μ at 400 mgm. per sq. ft. Fine needle crystals were more effective than irregular particles and both were better than hexagonal plate crystals, all being of the same weight. The most effective particles showed no increase in initial lethal effect at doses over 3 mgm. per sq. ft., though the persistence of the deposit was improved by increasing the dosage.

Similar effects were observed with other insecticides (DDD, methoxychlor, BHC, Dieldrin). The explanation apparently depends on the ease of pick-up (and retention) of the toxic particles by the insects.

Experiments with inert ingredients showed that they exercised a masking effect (*i.e.*, covered up the insecticide and reduced kill), so that as little as possible should be used in a good wettable powder.

Investigations were also made of the growth of different types of crystals of DDT from precipitation of water-miscible solutions and also from residual films on surfaces. The type of crystals produced in film depends a good deal on the nature of the surface and the volatility of the solvent. The crystal size tends to increase with the boiling point of the solvent.

The team investigated the toxicity of films of plastics and synthetic resins (chlorinated rubber, polymethyl methacrylate and urea-formaldehyde resin) in which insecticide had been incorporated. The object of this combination is, to produce a surface on to which a bloom of crystals of insecticide is extruded which will be renewed if it is wiped away. With the plastics, this effect can only be achieved at certain ratios of insecticide, plastic and plasticizer.

Another type of experiment investigated the toxicity of deposits of sprays of different sizes of drops (produced by a spinning disk sprayer). Equivalent weights of DDT per unit area killed more *Glossina* (exposed 30 seconds) when the drop size was reduced from 0·5 mm. to 0·15 mm. in diameter. Much of the effect depended on the rate of volatilization of the solvent and the type of crystallization.

Initial experiments were made with Dieldrin, Chlordane and Toxaphene. The first mentioned seems to be about as insecticidal as *gamma* BHC and to be much more persistent. Chlordan has a fairly high initial toxicity to mosquitoes, but soon loses its effectiveness. Toxaphene is not good against mosquitoes.

Tests of the fumigant action of the newer synthetic insecticides, placed them in the following (decreasing) order of effectiveness : *gamma* BHC, Aldrin, Chlordan, Dieldrin, Toxaphene.

Other work at Porton has concerned refinement of methods of analysis of DDT in spray deposits, determination of powers of surface active agents, etc.

Colonial Insecticide Research Unit, East Africa

Trials of air spraying against tsetse-flies gave rather better results with smokes of DDT and BHC than with liquid spray (63 and 69 per cent. reductions as compared with 54 and 40 per cent. respectively). This attributed to better penetration of the small smoke particles.

A previously reported barrier spraying with DDT was continued. Seven applications were made over 8 square miles, with 0·25 lb. DDT per acre. It was estimated that only 50–60 per cent. of the flies were killed by the barrier, but since conditions were unfavourable inside, the fly population fell to zero after 5 treatments and remained so for a month, despite the passage of 13,000 cattle. Cost was £100 per square mile per application.

Air application of exhaust smoke of DDT was made fortnightly, to a bloc of 6 square miles of light bush. Another similar trial was done in a block of 9 square miles, with BHC (12 per cent. *gamma*). The results compared as follows :—

	DDT trial block		BHC trial block	
	Test	Control	Test	Control
Average fly count ; 7 weeks before treatment	(1) 524 (2) 112	94	38 279	94
Average fly count for 9 weeks afterwards	(1) 0·5 (2) 0·5	73	2·5 24·5	73

(1) *G. morsitans ;* (2) *G. swynnertoni.*

It is noted that the BHC block was rather difficult to treat effectively owing to topography.

Detailed results of the preliminary air spray trials suggest that equipment must be modified and improved. This has been done and will be tested in the field next year.

Promising results have been obtained by hand spray treatment of bushes from the ground.

Mosquitoes and Malaria

House spraying of native huts in villages in Uganda has continued. Entomological findings at one village showed that catches of both *Anopheles gambiae* and *A. funestus* were less in treated than untreated houses, and that the catches in the latter were lower than in untreated houses outside the sprayed village.

An investigation of the parasite rates in a number of villages, however, did not show very great improvement over 1946 figures. Most present results were about half or two-thirds of the initial rates, which ranged from 20 to 54 per cent.

The technique of Muirhead Thomson has been followed, but more favourable results were obtained. It is suggested that his results may have been partly due to an imperfect DDT preparation which did not kill the *A. gambiae* after contact.

Malaria Eradication in Mauritius

This scheme is continuing, but no interesting new data are yet available.

Malaria control in Malaya

A large field trial has been started, in isolated valley communities, one being treated throughout with DDT house spray, another with BHC spray, etc. No results are available yet. *J. R. Busvine*

SASA, M. **Zoophilism. Hibernation and Appearance of Mosquitoes of Japan.** *Japanese Med. J.* 1949, Apr., v. 2, No. 2, 99–107.

Experiments were carried out to determine the degrees of zoophilism and the hibernating habits of various Japanese mosquitoes. Those used for the zoophilism experiments were collected from animal-bait traps and stables, the former containing various animals, singly and in combination. Only night-biting species could be collected in these traps as diurnal species escaped from the opening. The highest mean number of mosquitoes collected per trap in one night was in that containing two rabbits and three chickens. Of the species in all the traps, there was a higher percentage of *Culex tritaeniorhynchus* than any other, but the species having the greatest rate of engorgement was found to be *Anopheles hyrcanus sinensis*. Those species particularly attracted to, and feeding on, chickens were : *Culex pipiens pallens* and *Culex bitaeniorhynchus ;* rabbits, goats, horses and cattle, *Culex tritaeniorhynchus* and *Culex vishnui*. *Anopheles hyrcanus sinensis* is particularly attracted to goats, while *Culex tritaeniorhynchus* makes up the greatest percentage of those feeding on human beings. It is pointed out that as these species feeding on birds and domestic animals will also feed on human beings, they may be important as vectors of some of the virus diseases, such as Japanese B encephalitis.

Of mosquitoes collected in animal sheds, *Culex tritaeniorhynchus*, *Anopheles hyrcanus sinensis*, *Armigeres obturbans*, *Aëdes vexans nipponii* were the common species found, though there were seasonal variations in the numbers. *Culex pipiens pallens* was the most common in Northern Japan.

Japanese mosquitoes pass the winter in various stages of their life histories which can be summarized generally as follows : most anophelines and culicines, with the exception of aëdines, pass the winter in the adult stage. The genus *Aëdes* survives the cold weather in the egg stage.

Detailed tables of the results are given [minor arithmetical errors were noted in Table I]. *G. W. A. Talbot*

RACHOU, R. G. & DE SOUSA, J. Do encontro de ume xemplar de *A* (*M*) *nigritarsis* (Chagas, 1907) no Estada do Parana. [**Identification of** *Anopheles* (**M**) *nigritarsis* **in the State of Parana, Brazil.**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1950, July, v. 2, No. 3, 234–8, 1 fig.

The English summary appended to the paper is as follows :—

" *Anopheles* (*Myzorhynchella*) *nigritarsis* is a very rare anopheline, described by Chagas, in 1907, from Oliveira (State of Minas Gerais) ; he described only the female. Eggs, larva, pupa and male's terminalia are unknown. From 1907 to 1949 no one had found this anopheline, whose geographic distribution was restricted to its type-locality, which made modern writers suppose that this species was an anomaly of *A* (*M*) *lutzi*. The authors found, in 1949, in Carlópolis (Paraná) one single female of *nigritarsis*, and in this paper they give a description of the wing. Searches are being made in this last locality to find new specimens, including larvae and males."

TEESDALE, C. **An Apparent Invasion of** *Aëdes* (*Banksinella*) *lineatopennis* **and** *Aëdes* (*B.*) *albicosta* **into Mombasa Island.** *Proc. Roy. Entom. Soc. of London*. Ser. A. 1950, Dec. 15, v. 25, Pts. 10/12, 99–102, 1 fig.

" 1. An apparent invasion of *Aë. lineatopennis* and *Aë. albicosta* occurred at Mombasa and on the surrounding mainland on 10th January, 1944, and lasted about three days.

"2. No breeding grounds of either species were found within a radius of at least three miles of the island.

"3. Larvae of *Aë. lineatopennis* have only been recorded on four occasions since 1936 (the last time in 1942) and these were on the mainland. Those of *Aë. albicosta* are not known.

"4. The invasion occurred during the off-season and subsequently to exceptionally dry conditions."

WOODHILL, A. R. **A New Subspecies of *Aëdes* (*Stegomyia*) *scutellaris* Walker (Diptera, Culicidae) from Northern Australia.** *Proc. Linnean Soc. of New South Wales.* 1949, v. 74, Pts. 3/4, 140–44, 4 figs.

WOODHILL, A. R. **A Note on Experimental Crossing of *Aëdes* (*Stegomyia*) *scutellaris scutellaris* Walker and *Aëdes* (*Stegomyia*) *scutellaris katherinensis* Woodhill (Diptera, Culicidae).** *Proc. Linnean Soc. of New South Wales.* 1949, v. 74, Pts. 5/6, 224–6, 1 map.

i. DEONIER, C. C. & GILBERT, I. H. **Resistance of Salt-Marsh Mosquitoes to DDT and other Insecticides.** *Mosquito News.* 1950, Sept., v. 10, No. 3, 138–43.

ii. ——, CAIN, T. L., Jr. & MCDUFFIE, W. C. **Aerial Spray Tests on Adult Salt-Marsh Mosquitoes Resistant to DDT.** *J. Econom. Entom.* 1950, Aug., v. 43, No. 4, 506–10.

Aerial applications of DDT in the Cocoa Beach area of Brevard County, Florida, in the summer of 1949, were not giving such good control of salt-marsh mosquitoes, *Aëdes taeniorhynchus* and *Aëdes sollicitans*, as previously. The area had been sprayed intensively for 5 years, and it was feared that the mosquitoes had become resistant to DDT.

i. Laboratory experiments in which 4th instar larvae, collected from untreated and intensively treated areas, were exposed in acetone water suspensions of DDT proved that larvae from treated areas were resistant.

Date	Location	Percentage Mortality of *A. taeniorhynchus* 48 hours after the application of DDT			
		0·05 p.p.m.	0·025	0·01	0·005
Aug. 26	Treated area ...	100	76	44	16
Sept. 1	" " ...	0	0	0	0
Sept. 15	" " ...	16	12	4	0
Aug. 26	Untreated area	100	100	100	100
Sept. 1	" " ...	100	98	96	38
Sept. 15	" " ...	100	100	58	22

TDE (Dichlor diphenyl dichlorethane) also gave a lower kill of larvae from DDT-treated marshes than toxaphene, dieldrin, lindane, chlordane and parathion. Parathion was the most toxic insecticide against both *A. taeniorhynchus* and *A. sollicitans*. Adult *A. taeniorhynchus* from treated areas also showed a resistance to DDT and TDE. In space spray tests adult mosquitoes from treated areas were slightly less susceptible to toxaphene, lindane, technical BHC, and chlordane than mosquitoes from untreated areas.

ii. Apart from the laboratory experiments airplane spray tests were carried out over the Cocoa Beach area to determine whether lindane, technical BHC, toxaphane, parathion, chlordane or dieldrin would be satisfactory substitutes for DDT in controlling adult *Aëdes*.

Lindane, which was the most effective insecticide, controlled both *Aëdes sollicitans* in open areas and *A. taeniorhynchus* in woods when applied at the rate of 0·1 lb./acre. Technical BHC applied at 0·2 and at 0·4 lb./acre was comparable in effectiveness with lindane at 0·05 and 0·1 lb./acre in open marshes, but less effective in wooded areas. Dieldrin and parathion both applied at 0·1 and 0·05 lb./acre although quite effective did not compare with lindane. At dosages of 0·2 and 0·3 lb./acre neither DDT nor chlordane were effective, although at 0·6 lb./acre chlordane gave a good control for 6 hours.

C. M. Harrison

King, W. V. **DDT-Resistant House Flies and Mosquitoes.** *J. Econom. Entom.* 1950, Aug., v. 43, No. 4, 527–32.

Insecticides used against DDT-resistant houseflies in dairy barns in Florida gave the following results : a chlordane emulsion applied at the rate of 100 and 200 mgm./sq. ft. gave the most satisfactory control. The other insecticides arranged in order of effectiveness were : dieldrin emulsion applied at 50 mgm./sq. ft. ; lindane wettable spray at 50 mgm./sq. ft. toxaphene emulsion at 200 mg./sq. ft. DDT-methoxychlor wettable powder spray at 200 mgm./sq. ft. ; and pyrethrum extract with piperonyl butoxide.

Flies taken from 18 Orlando farms showed a resistance to DDT ranging from 4 to 17 times that of a normal laboratory strain. Nine of these strains had a slight resistance to methoxychlor, lindane, toxaphene and dieldrin. A number of DDT-resistant fly stocks showed a loss of resistance to DDT when bred in the laboratory, although the degree of loss varied from stock to stock.

Aerial spraying tests in Brevard County, Florida, have shown that both larvae and adult mosquitoes *Aëdes taeniorhynchus* and *Aëdes sollicitans* from areas which have been treated with DDT for 4 years are more resistant to DDT than mosquitoes of the same species from unsprayed areas. [See Deonier and Gilbert above.] Toxaphene, dieldrin, lindane, chlordane, and parathion, were equally toxic to larvae from treated and untreated areas. TDE on the other hand, was less effective. *Aëdes taeniorhynchus* adults were resistant to DDT, TDE and slightly to toxaphene, but not to lindane, technical BHC or chlordane. In field tests lindane applied at the rate of 0·1 lb./acre was the most effective material in areas previously treated with DDT. Parathion and technical BHC applied at 0·2 and 0·4 lb./acre were as effective as lindane in open marshes but not in wooded areas.

There was no evidence of increased resistance to DDT of *Anopheles pseudopunctipennis* taken from premises in Mexico which had been treated with DDT residual sprays each spring for 4 years.

An attempt to breed a DDT-resistant strain of body lice *Pediculus humanis corporis* by exposing the insects to DDT and selecting the most resistant individuals over 8 generations failed.

C. M. Harrison

Pimentel, D., Schwardt, H. H. & Norton, L. B. **House Fly Control in Dairy Barns.** *J. Econom. Entom.* 1950, Aug., v. 43, No. 4, 510–15. [10 refs.]

During 1945–1947 a spray containing 3 lb. of DDT in 100 gallons of water gave a good control of house-flies for two months in dairy barns in New York State. In 1949, however, treatment with a spray containing 30 lb. of DDT in

100 gallons of water gave an average of only two weeks control. (1 lb. of insecticide in 100 gallons of water was calculated to give a deposit of 15 mgm./sq. ft. of wall surface.)

The following treatments were found to control these DDT resistant flies for 4 weeks in tests on 148 heavily infested barns :—

Lindane 2 lb./100 gallons as an emulsion
Chlordane 6, 12 and 24 lb. as an emulsion
Toxaphene 8 lb. as an emulsion
Toxaphene 16 lb. as an emulsion by spot treatment, *i.e.*, treatment of places most frequented by flies
DDT 3 lb. as a wettable powder with chlordane 6 lb. as an emulsion

Emulsions of lindane and toxaphene proved to be more effective than wettable powders of the same insecticides. A mixture of DDT and chlordane was better than chlordane alone, or DDT alone, but lindane with DDT was inferior to lindane alone ; this may have been due to the lower concentration of lindane used in the mixture.

Although toxaphene applied with a thermal aerosol applicator cleared barns of flies immediately, reinfestation was exceedingly rapid. Small amounts of DDT and lindane were found in the milk from cattle in insecticide-sprayed barns for a period of four weeks after spraying. *C. M. Harrison*

HARRISON, R. A. **Laboratory Breeding of the Housefly** (*Musca domestica* **L.).** *New Zealand J. Sci. Tech.* 1950, v. 30 (B), No. 4, 243–7, 3 figs.

FLOCH, H. & ABONNENC, C. Les culicoides de la Guadeloupe. Description de *Culicoides guadeloupensis* n. sp. [**Description of** *Culicoides guadeloupensis*.] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 203.* 1950, Jan., 5 pp., 1 fig. [16 refs.]

MACKERRAS, M. J. & MACKERRAS, I. M. **Notes on Australasian Simuliidae (Diptera). II.** Reprinted from *Proc. Linnean Soc. of New South Wales.* 1950, v. 75, Pts. 3/4, 167–87, 15 figs.

WANSON, M., COURTOIS, L. & BERVOETS, W. L'extinction des simulies de rivières à Léopoldville. [**Destruction of** *Simulium* **in Streams at Léopoldville.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 629–37.

Simulium albivirgulatum and *S. faini*, although not carriers of *Onchocerca volvulus*, bite man and animals viciously, and constitute a nuisance in the vicinity of Léopoldville. In consequence an attempt was made to destroy them in the larval stages by applying " Gammexane " to the small rivers where they breed. Two forms of the insecticide were used—an emulsion (Solvay) and a dispersible powder (John Powell). The flow of water was established and the diluted insecticide was applied, not drop by drop, but in quantities of 5–10 litres every minute or so for half an hour. The final dilution in the river itself varied between 0·1, 1 and 1·5 mgm. of the *gamma* isomer per litre of water. The lowest dosage suppressed larvae only for 4 days, the highest dosage acted for a fortnight and even killed the young pupae also. Adult flies disappeared after six days. The authors also used the technique of Romana, *i.e.*, throwing a large quantity (5–250 kgm.) of dispersible powder into the head of the river, mixing it by means of a stick and arriving at a final dilution of 3 mgm. of the *gamma* isomer per litre. Larvae disappeared for a distance of at least 3 miles downstream. Breeding of the flies has now been

prevented for 8 months in all the treated rivers. In practice a single application of larvicide was all that was found necessary for control.

This method of *Simulium* destruction has the disadvantage that it kills the small fish, although repeated dosages are necessary before the fish are entirely exterminated ; the danger is greatest where the current is slow. Frogs and crustaceans are affected, but not algae ; the effect on molluscs is unknown, because mosquito control since 1928 has been accompanied by total disappearance of snails. *P. C. C. Garnham*

NÁJERA, L. E. **New Technique for the Breeding and Maintenance of *Phlebotomus* Colonies.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Dec., v. 2, No. 4, 312–17, 5 figs.

The author figures and describes a cage in which a culture of *Phlebotomus* has been maintained for several generations.

The cage is a rectangular box of glass and sheet metal, provided with sleeves, and small openings through which one may extract sandflies by aspiration. It is open below, and the rim is thrust down into a tray containing damp sand. Inside it there are small inverted flower pots containing a layer of powdered guineapig droppings and yolk of egg, on a layer of damp plaster. Females *Phlebotomus* lay eggs in this, in the darkness and moist atmosphere inside the flower pot. A baby rat in a small wire container is inserted from time to time to feed the adult insects.

At 25°C.–30°C. the cycle (species ?) occupies 24 to 35 days. One female *P. ariasi* produced 382 adult descendants in three months. *P. A. Buxton*

FLOCH, H. & ABONNENC, E. Phlébotomes du Vénézuela (III). Description d'une espèce nouvelle : *Phlebotomus lichyi.* [*Phlebotomus* **in Venezuela. III. Description of a New Species,** *Phlebotomus lichyi.*] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 208.* 1950, May, 5 pp., 2 figs.

MCDUFFIE, W. C., EDDY, G. W., CLARK, J. C. & HUSMAN, C. N. **Field Studies with Insecticides to control the Lone Star Tick in Texas.** *J. Econom. Entom.* 1950, Aug., v. 43, No. 4, 520–27.

An account is given of tests at Bullis Camp with chlordane, toxaphene, technical benzene hexachloride (18 per cent. gamma isomer) as spray and dust, lethane 380 and thanite as sprays and DDT, nicotine sulphate and pyrethrum as dusts and sprays against *Amblyomma americanum.* Estimates of the tick population before and after treatment were obtained by flagging. An important feature of the tick infestation was the protection which the tick derived from ground litter, usually leaves and twigs.

DDT, chlordane and toxaphene, applied at 1 and 2 lb. per acre in 5 to 20 gallons of oil or water carrier, gave a poor immediate reduction, although their residual effect was good. Greater amounts of liquid carrier gave better penetrate of the ground litter and increased the knockdown effect. Benzene hexachloride proved to have a stronger immediate effect than DDT but its residual action was not so good.

In aircraft sprays, BHC at 1·5 lb. per acre and DDT at 2·5 and 5 lb. per acre in 1·5 to 3 gallons of oil were inadequate. DDT at 5 lb. per acre in 6 to 12 gallons of oil gave slightly better results.

Tests with dusts applied at 1 and 2 lb. DDT per acre were ineffective except on the large nymphal population in late summer. At other times 40 lb. per acre of 10 per cent. DDT dust was required for control, although even this dosage had very variable effects. Similarly poor results were obtained with

chlordane and toxaphene at 1 and 2 lb. per acre. Applications of 1 and 2 lb. per acre of BHC were effective immediately and for 1 to 2 weeks. Several mixtures of DDT and BHC were tested as dusts and the best of these tested consisted of 7·5 per cent. DDT and 2·5 per cent. BHC at 20 ml. 40 lb. per acre. Tests with 2 per cent. nicotine dusts at 40 lb. per acre gave good results, as did 0·2 and 0·4 per cent. dust of pyrethrins at similar rates of application. Dusts containing 0·2 per cent. pyrethrins and 2·0 to 2·5 per cent. of an activator (piperonyl cyclonene or piperonyl butoxide) were rather less effective than pyrethrins alone.

In a large-scale test 10 per cent. DDT dust applied by power dusters at 43 lb. per acre gave a poor immediate effect but after six weeks good control which lasted for about 40 weeks. It was found that many ground- and bush-feeding birds were killed in the first week after this treatment, but no harmful effect was observed on deer and small mammals.

In later tests at Kerrville, Texas, less difference was found between immediate and residual effects and BHC gave better residual effects. *J. H. Sudd*

Gouck, H. K. & Fluno, J. A. **Field Tests on Control of American Dog Tick in Massachusetts.** *J. Econom. Entom.* 1950, Oct., v. 43, No. 5, 698–701.

In testing various insecticides against the American dog tick, *Dermacentor variabilis* DDT and dieldrin were found to be extremely effective. The tests were made on small roadside plots in south-eastern Massachusetts during 1948 and 1949. Estimates of the tick population before and after treatment were made by flagging. The insecticides tested were (1) emulsions : DDT, toxaphene, and chlordane at dosages of 2·5 and 1·0 lb. per acre, and parathion at 0·5 lb. per acre ; (2) oil solutions (all as 12 per cent. oil solution at 1 lb. per acre) : DDT, toxaphene, dieldrin and chlordane. The dosage used in 1 gallon of oil gave the same degree of control as the same dosage applied in 15 gallons of emulsion.

Tests were made of the effects of spraying DDT from aircraft at the rate of 0·25, 0·5 and 1·0 lb. per acre at various places. It was found that application of 1 lb. per acre gave a considerable amount of control but the results of smaller dosages were very variable. The planned rate of application of DDT in control of the gypsy moth in that area is 0·5 lb. per acre. Spraying from a helicopter was as effective as an equal dosage applied with ground equipment.
J. H. Sudd

Jensen, J. A., Sumerford, W. T. & Fay, R. W. **Rosin as an Insecticide Adhesive. The Use of Pine Gum Rosin as an Adhesive in Outdoor DDT Residual Sprays improves Weathering Properties and the Insecticidal Efficiency of Residual Deposits.** *Soap.* New York. 1950. Nov., v. 26, No. 11, 121–3.

Although residual DDT deposits remain effective for 3 to 4 months on indoor surfaces, they fail in less than 6 weeks when subjected to outdoor weathering effects. Weathering of deposits is minimized by the use of adhesives in the sprays. Adhesives must have the following properties : (1) ready solubility in water or xylene, (2) compatibility with other spray ingredients, (3) non-fouling of spray equipment, and (4) ready availability and reasonable cost.

Ten compounds were tested for emulsion stability and adhesive properties, two were satisfactory, but on consideration of cost, pine gum rosin was the better. A series of emulsions were made to test the effect at 0, ½, 1 and 2 per cent. concentrations, with and without emulsifier, and exposed sets of panels were tested for insecticidal efficiency bi-weekly. Results show slightly better

effectiveness in formulations where emulsifier is omitted, and improved weathering ability with increasing amounts of resin. With 2 per cent. rosin content, more than 90 per cent. kill of test insects was observed for periods of three to four months.

For outdoor DDT residual sprays for fly control a suggested formula for a DDT concentrate is—

DDT	... ...	25 per cent. (105 lb.)
Xylene	... ...	63 per cent. (36 gallons)
Suitable Emulsifier	...	2 per cent. (1 gallon)
Pine gum rosin	... ...	10 per cent. (42 lb.)

This concentrate is made up in the above order, and diluted in the field with four parts of water to produce a 5 per cent. DDT emulsion.

Thomas E. Fletcher

LABORATORY PROCEDURES

WOLFF, J. W. **A New Staining Method for Rickettsiae.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Dec., v. 2, No. 4, 327–8, 1 fig.

The modification of Boyé's staining method used by the author for staining malaria parasites [this *Bulletin*, 1949, v. 46, 96] has been applied successfully to the staining of rickettsiae in such infected material as peritoneal and spleen tissue. Details of the composition and use of the method are given and are substantially the same as those previously described. It is noted that smears should be as thin as possible, so that one layer of endothelial cells may be visible.

The author describes the various staining appearances of different cellular components. It is observed that intracellular rickettsiae are dark violet and stand out clearly against the light slate-blue background of the cell protoplasm —they are easy to differentiate from other cell inclusions. The appearance is illustrated in a photomicrograph. As the stain is easy to prepare, it should be valuable to workers in the tropics.

[The instructions for staining are somewhat confusing. Reference is made to " Solution A " and " Solution B " which clearly refer to Stevenel blue and eosin respectively : these two solutions are, however, referred to in the text as (I) and (II) and the letters A and B are used to identify the two component solutions of Stevenel blue.] *H. J. O'D. Burke-Gaffney*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

AFRIQUE OCCIDENTALE FRANÇAISE. Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1948 [DURIEUX, C.]. [**Technical Report of the Pasteur Institute in French West Africa in 1948.**] 116 pp., 1 chart. 1950. Dakar : Grande Imprimerie Africaine.

This Report covers the usual ground of giving an account of the routine and research investigations of the Institute. The layout and subject matter follow on the usual lines [see this *Bulletin*, 1949, v. 46, 1095 for previous Report].

Altogether 37,921 examinations were made of which 15,606 were bacteriological or parasitological, 17,357 were serological, 585 pathological and 4,373 chemical.

Vaccines and biological products prepared amounted to a little short of 8 million doses or cc. The Yellow Fever section produced nearly 7½ million doses of vaccine and over 4 million persons were vaccinated with it, constituting a record.

The Rabies section distributed 24,563 ampoules of antirabic vaccine to the eight territories of the Federation. At the Institute, 34 people were treated, all but five having been bitten by dogs. There were no paralytic accidents and no deaths. In out-stations, 489 persons were treated, all but 17 having been bitten by dogs. There were no paralytic accidents, but four African children under 9 years died of rabies.

Yellow fever protection tests were carried out on 477 human and 14 animal sera. Of the former, 415 were tested to judge the immunity of people in Dakar : 81·44 per cent. were judged to be immune.

There were two cases of yellow fever, both in Europeans and both fatal. One was from the Sudan province and the other from the Ivory Coast. In each case, protection tests were negative and the diagnosis was made by histological examination of the liver.

Among the special investigations reported is the well-known work of BOIRON on the transmission by lice of *Spirochaeta duttoni* var. *crocidurae* and that of AUFFRET and TANGUY on Vitamin C estimations and food values, all of which have been noticed from time to time in this *Bulletin*.

There are also some detailed accounts of unusual neoplasms examined.

H. J. O'D. Burke-Gaffney

J. PARASITOLOGY. 1950, Dec., v. 36, No. 6, Sect. 2 (Suppl.), 58 pp. **Program and Abstracts of the 25th Annual Meeting, American Society of Parasitologists, Cleveland, Ohio, Dec. 27, 28 and 29, 1950.**

This annual publication follows the lines of its predecessors. There is a detailed programme of the papers and demonstrations presented at the meeting. This is followed by an author index of the 120 short abstracts published in the text. Most of the authors presented only one contribution, but it is noted that 15 presented two, 7 three, 3 four and 3 gave more than four.

The abstracts are for the most part concerned with parasites not of immediate medical interest, but those of special interest to readers of this *Bulletin* include 6 abstracts dealing with schistosomiasis [*S. japonicum*], 5 with cultivation of and 4 with experimental infection by *Entamoeba histolytica*, 5 with avian malaria, 3 with human tapeworms, 2 each with ascariasis, trichinosis, and trypanosomiasis, and 1 each with monkey malaria, rat mites and toxoplasmosis.

H. J. O'D. Burke-Gaffney

CHARTRES, J. C. **Medical Field Units, Nigeria : their Functions and Work.** *Brit. Med. J.* 1951, Jan. 13, 85–8, 2 figs.

The Colonial Medical Service is said to have originated from Joseph Chamberlain's disquietude at the high mortality among colonial officers in West Africa when he was Secretary of State for the Colonies. It was for many years a garrison service but now more and more it is reaching out from the administrative and commercial centres into the vast regions of sparsely scattered population.

In this article the author gives an account of how the medical department of Nigeria is reorganizing its resources to deal with important endemic and epidemic diseases in the rural areas.

The new service is known as Medical Field Units and to date eight have been trained and six are working. Each unit has a medical officer, a superintendent (ex-R.A.M.C.), 18 to 24 dressers and drivers, clerks and messengers.

A primary duty of a unit is to help local staffs during an epidemic, and another important duty is the discovery of the incidence and relative importance of diseases in the rural population, and after that the contrivance of measures against those which are causing most damage to the public health.

Information is obtained by general and detailed medical survey, the latter including full clinical examination and adequate laboratory investigation.

Treatment is given for such diseases as trypanosomiasis, yaws, schistosomiasis, scabies, etc., and on the completion of the survey two dressers are left behind to complete courses of treatment begun.

An attempt is made to instruct and interest village elders in disease prevention by talks and demonstrations.

The findings of a district survey are given as an illustration of the type of information obtained and of the way in which the principal public health problems are brought to light. *H. G. Calwell*

ARGIL, G. Progreso sanitario de Mexico. [**Health Progress in Mexico.**] *Medicina.* Mexico. 1950, Nov. 25, v. 30, No. 616, 473–83, 4 figs.

The information given in this article is of little more than of local interest, for the various points dealt with are referred to in very general terms and few actual figures are given. During the past 4 years Health Centres have been established with specialists to attend to maternity and child welfare, tuberculosis and venereal disease. There are in addition 125 Health Units, 94 rural units and 24 aid-posts. For *tuberculosis* there are two large hospitals each with 300 beds, and during the 4 years 300,000 radiological examinations have been made and 1·39 per cent. gave positive indications of infection. Vaccination with BCG was started in January 1949. In the State of Hidalgo 22,000 have been examined and 10,000 have been vaccinated ; in Veracruz the corresponding figures were 60,000 and 23,000. *Venereal disease* ; nothing is said of the prevalence ; penicillin is used for treatment. *Malaria* is combated by engineering projects and abundant use of DDT ; no mention is made of the prevalence, of the vectors or of the nature of infection. *Smallpox* ; about 18 million vaccinations have been performed in the past 4 years, 6 million in the last year. Deaths from this disease have fallen rapidly ; in 1930 they numbered 17,405 ; in 1949, 398 ; in 1950, 75. *Onchocerciasis* is treated with Hetrazan, 24,000 have been so treated. A recent census gave 1,766 *leprosy* patients registered in the past 4 years ; there are 21 dispensaries for dealing with these patients and there are also leprosaria and " prevention centres " [these are not defined]. Other diseases mentioned are brucellosis, typhus and spotted fever, the last transmitted by *Rhipicephalus sanguineus*, and rabies, but without any details.
H. Harold Scott

NOGUEIRA, J. P. & COITO, A. M. Relatório dos trabalhos efectuados na parte sul da Ilha de Santo Antão e na Ilha Brava. [**Account of Work carried out in the Islands of Santo Antão and Brava.**] *Anais Inst. Med. Trop.* Lisbon. 1950, July, v. 7, 477–507, 17 figs. & 3 maps.

This is a general report of the work of a Mission sent out by the Institute of Tropical Medicine to Cape Verde Islands. Faeces were examined for helminthic

and protozoal parasites, blood for malaria, and inspection for leprosy. Of 860 children between 2 and 12 years of age none was found with a palpable spleen and only one had parasites (*P. falciparum*) in the blood. Water collections were examined for anopheline larvae. Mosquitoes caught included *A. gambiae*, *Culex fatigans* and *Aëdes aegypti*. *Tunga penetrans* was fairly widely distributed and *Simulium* larvae numerous in the waters of the islands. The helminthic findings have already been noted [see NOGUEIRA & COITO above, p. 384] and the illustrations of the previous article have again been reproduced in this.

H. Harold Scott

BOOK REVIEW.

FINDLAY, G. M. [C.B.E., Sc.D., M.D., F.R.C.P.]. **Recent Advances in Chemotherapy. Vol. II.** 3rd Edition. pp. ix+597, 1 pl. 1951. London: J. & A. Churchill Ltd., 104 Gloucester Place, W.1. [36*s*.]

The appearance of the third edition of "Recent Advances in Chemotherapy" will be welcomed by all who are interested in this subject. In view of the nature of the contents which include material now of historical interest a more accurate title might be "Treatise on Chemotherapy". In the two earlier editions all the diseases discussed were included in a single volume [this *Bulletin*, 1930, v. 27, 1029; 1939, v. 36, 350]. Owing to the widening frontiers of the subject the present edition will appear in four volumes of which Volume II is devoted entirely to malaria. This has been rendered necessary because of the increased volume of publications which resulted from a revived interest in the subject, stimulated by the pressing needs of war. During these years vast research programmes were undertaken and as a result of intensive studies from the biological and chemical angle notable results were achieved especially in Britain and America. The fact, as the author points out, that more human beings are affected by malaria than by any other single disease is a sufficient indication of its importance in peace or war. He puts that number on a conservative estimate, at the stupendous total of 700 million, 100 million sufferers being in India alone, with 2 to 3 million deaths resulting directly or indirectly each year.

The subject matter is divided into eleven chapters. In the first, the possible methods of approach to combating this scourge are indicated. The biology of the parasite, including the recent work of SHORTT and colleagues on exo-erythrocytic forms, and the method of assessing chemotherapeutical activity, including the use of mice infected with *P. berghei*, are dealt with in chapter II. In the following two chapters the chemical approach to the subject is outlined. After the section on the cinchona group of alkaloids, synthetic substances containing the quinoline or acridine nucleus, which embrace many important antimalarials, are described, followed by a host of other compounds which indicate the wide range of substances active against plasmodia. The researches leading to proguanil [paludrine] are treated very fully. The resonance theory invoked in explanation of the activity of this class of substance receives due attention. Chapter V describes the pharmacology and methods of estimation of the more important antimalarials, which is a valuable feature for those cut off from original papers. In spite of diversities in chemical structure similarities exist in the pharmacological action of antimalarial drugs. Toxic reactions produced by these substances are described in the chapter which follows, no less

than 30 pages being devoted to those produced by mepacrine as opposed to 10 pages for those following quinine administration; the details should be of value for those called upon to treat malaria. Chapters VII and VIII, which embrace 170 pages, deal with the chemotherapeutic treatment of plasmodial infections and serve as a valuable introduction to Chapter X in which the treatment of the disease in man is described. The large numbers of effective antimalarial compounds described and their wide diversity of action as regards species, strain and developmental stage of the various parasites make these chapters of absorbing interest. The statement on p. 272 that "the cinchona alkaloids have no action on schizonts or exo-erythrocytic forms of human malaria parasites" surely requires correction so far as schizonts are concerned as well as a similar statement concerning mepacrine on p. 342. A short chapter follows on the development of resistance of plasmodia to antimalarial drugs. While the problem of resistance is not so pressing as in trypanosomiasis, it is clear that the production of resistance is a feature of some of the recent synthetic products. An important section on immunity and chemotherapy is included. Chapter X illustrates how the diverse factors of parasite, host, and drug may play a part in the treatment of malaria infections in man, and how even the aims of treatment may not always be the same in different populations. Valuable indications are given for the use of certain types of drugs under different conditions and should prove of value in clinical practice. The complex question of the mode of action of antimalarial drugs which has attracted so much attention from biochemists and others in recent years is well surveyed in the final chapter. Besides the classical methods of investigating the problem of drug action new techniques used to study the effect on development of the malaria parasite in the mosquito are discussed, and later the relation between chemical constitution and antimalarial action. In the same way a study of the effect of drugs on the metabolism of plasmodia has only become possible within the last few years. In spite of the volume and frequently the high quality of the work reported in this field it cannot in truth be said that the practical results are commensurate with the efforts expended.

Remarkably few typographical errors were noted in the text and are of little consequence except to the carping reviewer. The first was seen on p. 12 "metachloride" for metachloridine. The name of an author "Koefli" is given for Koepfli p. 415. On p. 58 the structural formula for chloroquine is correctly given but on the same page the systematic name is given as 7-chloro-4-(4′diethylamino-1′-methylbutylamino)-3-methylquinoline, which is that of sontoquine, correctly given on the preceding page. The structural formula of this latter substance on p. 299 presents it as an anthracene derivative, the N atom of the quinoline ring having been omitted. Frequently the dashes attached to numerals in systematic names are omitted. The use of Greek letters on one page and of numerals on another to indicate the position of substituents in the same compound, was also encountered, depending no doubt on the author's source of information. The reviewer is of the opinion that a number of tables, especially in Chapter IV, culled from the literature could profitably be dispensed with. There is a subject and author index and a very full list of references at the end of each chapter or section of a chapter. The range of these references is truly remarkable and the fact that they are accompanied by the title of the paper in question enhances their value. Their up-to-date character is a matter for congratulation, and the reviewer who has had occasion to consult particularly those in the final chapter is not aware of any important omission. In conclusion it may be said that there was need for just such a volume as the present one in which all pertinent available knowledge has been adequately summarized and frequently discussed. It represents a vast amount of work and erudition on the part of the author who has given us a survey which accurately presents the

subject in an interesting and logical manner. The hope expressed on the cover "that this survey will be of interest and value to all those working on the malaria problem, whatever their angle of approach", will surely be fulfilled.

The publisher too has done a good job. The type is clear, the paper of good quality, covers handsome and robust, and the attached book mark is a pleasing and practical feature of the publication. *J. D. Fulton*

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